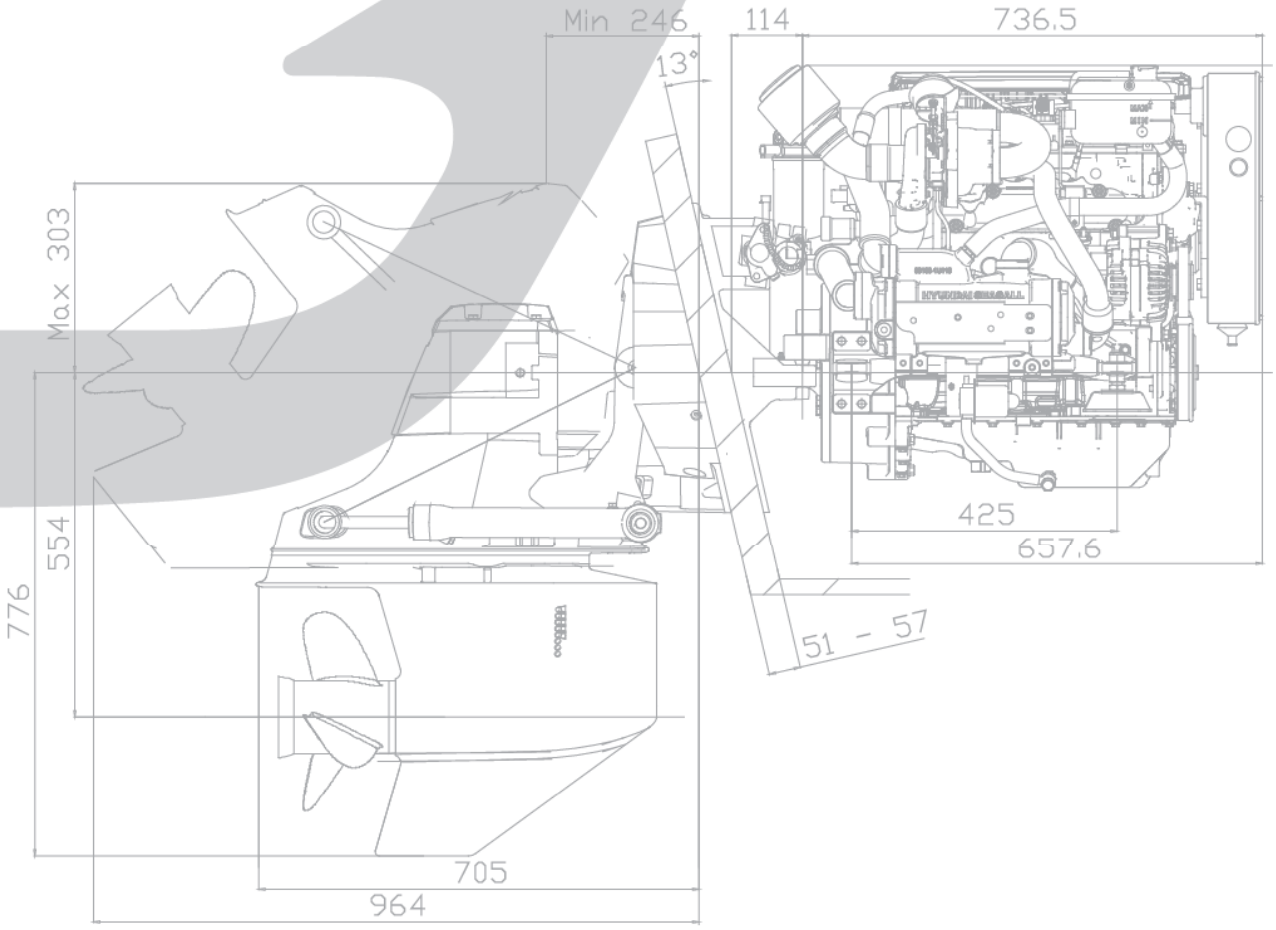
HYUNDAI SEASALL

INSTALLATION & OPERATION MANUAL

U125 SERIES ENGINES



Applicable to U125S, U125P, U125J model

1st Edition

TABLE OF CONTENTS

PAGE NUMBER

ABOUT THIS MANUAL 3
SAFETY PRECAUTIONS 4
ENGINE BREAK-IN 5

CHAPTER 1 ENGINE OVERVIEW 6
ENGINE COMPONENTS 6
ENGINE SUSPENSION EYES 7
ENGINE IDENTIFICATION 8
TECHNICAL DATA 9
PERFORMANCE CURVES 10
ENGINE DIMENSIONS 12

CHAPTER 2 ENGINE MOUNT SYSTEM 15
ENGINE MOUNTING REQUIREMENTS 15
MOUNT DIMENSIONS 15
ENGINE MOUNT TOOL FOR STERNDRIVE MODEL 16

CHAPTER 3 ENGINE OPERATION 17
STARTING ENGINE 17
STOPPING ENGINE 17
EMERGENCY STOP 18
WINTER OPERATION AND STORAGE 18

CHAPTER 4 COOLING & EXHAUST SYSTEM 19
SCHEMATIC DIAGRAM OF ENGINE COOLING CIRCUIT 19
SEAWATER FLOW 20
ENGINE COOLANT FLOW 23

CHAPTER 5 FUEL SYSTEM 26
SCHEMATIC DIAGRAM OF COMMON RAIL DIESEL ENGINE 27
FUEL FLOW 28
LOW PRESSURE FUEL LINE 28
ACCELERATION SENSOR AND CONTROL LEVER 29
RECOMMENDED FUEL QUALITY 30
DRAINING WATER FROM FUEL FILTER 30

CHAPTER 6 AIR INTAKE SYSTEM 31
ENGINE ROOM VENTILATION 31
CHECK AIR FILTER 32
CLEANING AIR FILTER 32

TABLE OF CONTENTS

PAGE NUMBER

CHAPTER 7 LUBRICATION SYSTEM 34
ENGINE OIL LEVEL CHECKS 34
RECOMMENDED OIL QUALITY 34
ENGINE OIL EXTACTION PUMP 35
OIL FILTER REPLACEMENT 35

CHAPTER 8 ELECTRICAL SYSTEM 36
BATTERY CABLE CONNECTIONS 36
BATTERY CHECKS 37
FUSES AND RELAYS 38

CHAPTER 9 INSTRUMENT SYSTEM 40
INSTRUMENT CONNECTIONS 40
STANDARD INSTRUMENTS 41
CUT-OUT FOR GAUGES 43
CUT-OUT FOR EOI SYSTEM 43

CHAPTER 10 EOI SYSTEM 44
1. OVERVIEW OF EOI SYSTEM 44
2. EOI CONNECTIONS 46
3. EOI PIN ASSIGNMENT 47
4. NEUTRAL SWITCH AND DUAL EOI CONNECTION 49
5. TRIM WIRING CONNECTION DIAGRAM 50
6. ALARM LIST AND DTC(DIAGNOSIS TROUBLE CODES) 51

CHAPTER 11 ANTI CORROSION SYSTEM 59

CHAPTER 12 ENGINE STORAGE 60

CHAPTER 13 MAINTENANCE 61
1. PREDELIVERY INSPECTION CHECK LIST 61
2. MAINTENANCE SCHEDULE 62
3. STERNDRIVE & TRANSMISSION MAINTENANCE SCHEDULE 63
4. MAINTENANCE LOG 64

CHAPTER 14 TROUBLESHOOTING GUIDE 65

CHAPTER 15 WARRANTY 67
WARRANTY REGISTRATION CARD 70

ABOUT THIS MANUAL

This engine installation and operation manual is provided as guidance for the installation of Hyundai SeasAll engine in a boat, and to describe engine operation. Its purpose is to provide technical information to aid in performing an effective engine installation so as to achieve both maximum performance and service life. For information on installation, operation and maintenance of the ZF Marine Transmissions and Sterndrive Bravo Models, please see the separate booklets included in the original packaging of your Hyundai SeasAll purchase.

Hyundai SeasAll is committed to making clear and accurate information available for those who maintain, own and repair the U125 Series engines. Hyundai SeasAll values your input regarding revisions and additional information for our manuals.

- The manufacturer is not liable for any damages or losses caused by faulty installation, wrong handling of the equipment and/or deficient maintenance.
- The operator is responsible for the correct and safe operation of the engine and safety of its occupants and general public.
- It is strongly recommended that each operator read and understand this manual before installing and operating the engine.
- This manual as well as safety labels posted on the engine use the following safety alerts to draw your attention to special safety instructions that should be followed.

WARNING

DEVIATION FROM INSTALLATION INSTRUCTIONS AND OPERATION GUIDELINES MAY LEAD TO PERSONAL INJURY OR DEATH TO OPERATORS AND NEARBY PERSONNEL.

CAUTION

DEVIATION FROM INSTALLATION INSTRUCTIONS AND OPERATION GUIDELINES MAY LEAD TO IMPROPER OPERATION, DAMAGE OR DESTRUCTION OF THE ENGINE.

SAFETY PRECAUTIONS

- Read and understand this operator's manual as well as other information supplied by Hyundai SeasAll for safe use of these products. Be sure to check your engine regularly.

- Do not use the engine for a purpose other than what is intended by Hyundai SeasAll. Do not modify the performance of the supplied engine without the express permission of Hyundai SeasAll. This can be dangerous, can shorten the life of your engine and can invalidate your warranty.

- Original and genuine parts supplied from Hyundai SeasAll must be used for inspections and maintenance. Hyundai SeasAll does not guarantee any damage caused by the use of imitation parts.

- Engine inspection and maintenance should be carried out by properly trained and factory approved service engineers.

- The engine should be inspected if the electronic engine control unit shuts down the engine.

HOT SURFACES AND FLUIDS

- There is always a risk of burns when working with a hot engine. Be aware of hot parts like the turbocharger system, the exhaust system, hot coolant hoses, etc. Wait until the engine is fully cool to do inspection and maintenance.

REFUELING

- Refuel only after the engine completely stops.

- Use only the recommended fuel. The wrong grade of fuel can cause operating problems, can cause the engine to stop and can cause engine damage.

- Pay special attention to safe practices when refueling.

PAINT DAMAGE

- Damage of the engine or parts paint during maintenance and inspection can cause corrosion. Any damage must be repainted after inspection and maintenance.

WELDING ON ENGINE

- Welding directly on the engine block can cause damage to the engine control systems. The ECU and related electronic devices must be disconnected and removed if unavoidable welding is needed.

.

ENGINE BREAK-IN

INITIAL BREAK-IN PROCEDURE

The first 20 hours of operation is the engine break-in period. During this period, it is important that the engine is operated as outlined below.

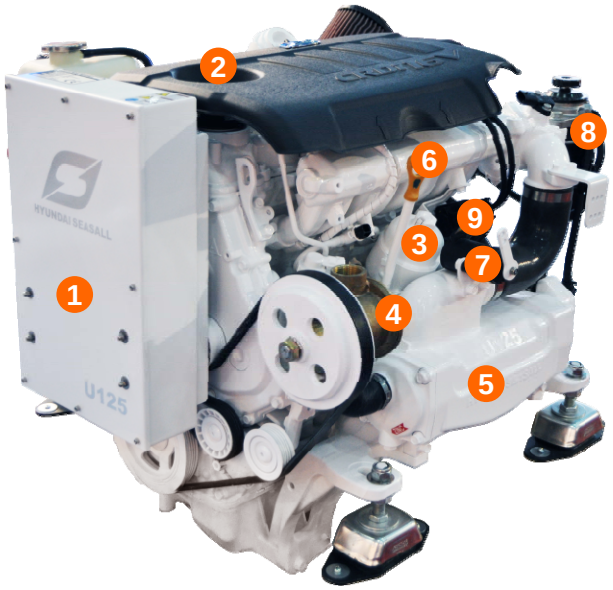
- DO NOT operate engine at idle rpm for extended periods of time during the first 10 hours.
- DO NOT operate at any one constant speed for extended periods of time.
- DO NOT exceed 75% of full throttle during the first 10 hours except during the engine initial Break-In Procedure. During the next 10 hours, occasional operation at full throttle (5 minutes at a time maximum) is permissible.
- AVOID full throttle accelerations from neutral position.
- DO NOT operate at all full throttle until engine reaches normal operating temperature.
- FREQUENTLY CHECK engine oil level and add oil if necessary.

WARNING

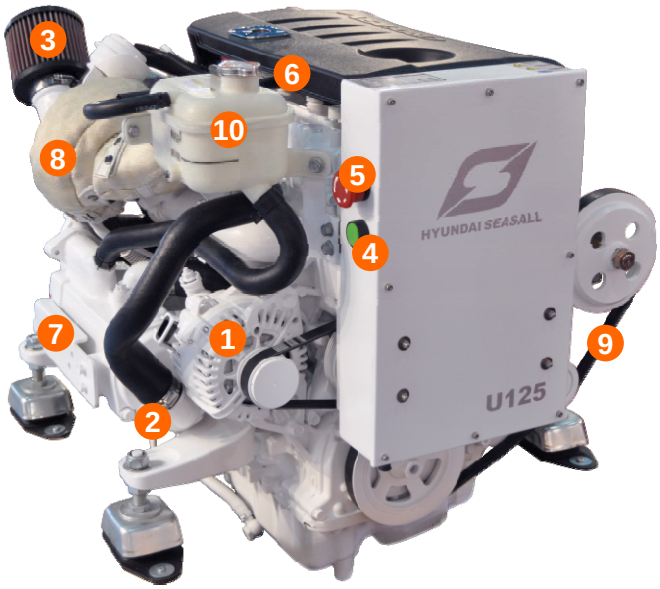
DO NOT DRIVE IN SPACE WHERE THERE IS NO AIR CIRCULATION. EMISSION GAS IS HARMFUL.

CHAPTER 1
ENGINE OVERVIEW

ENGINE COMPONENTS



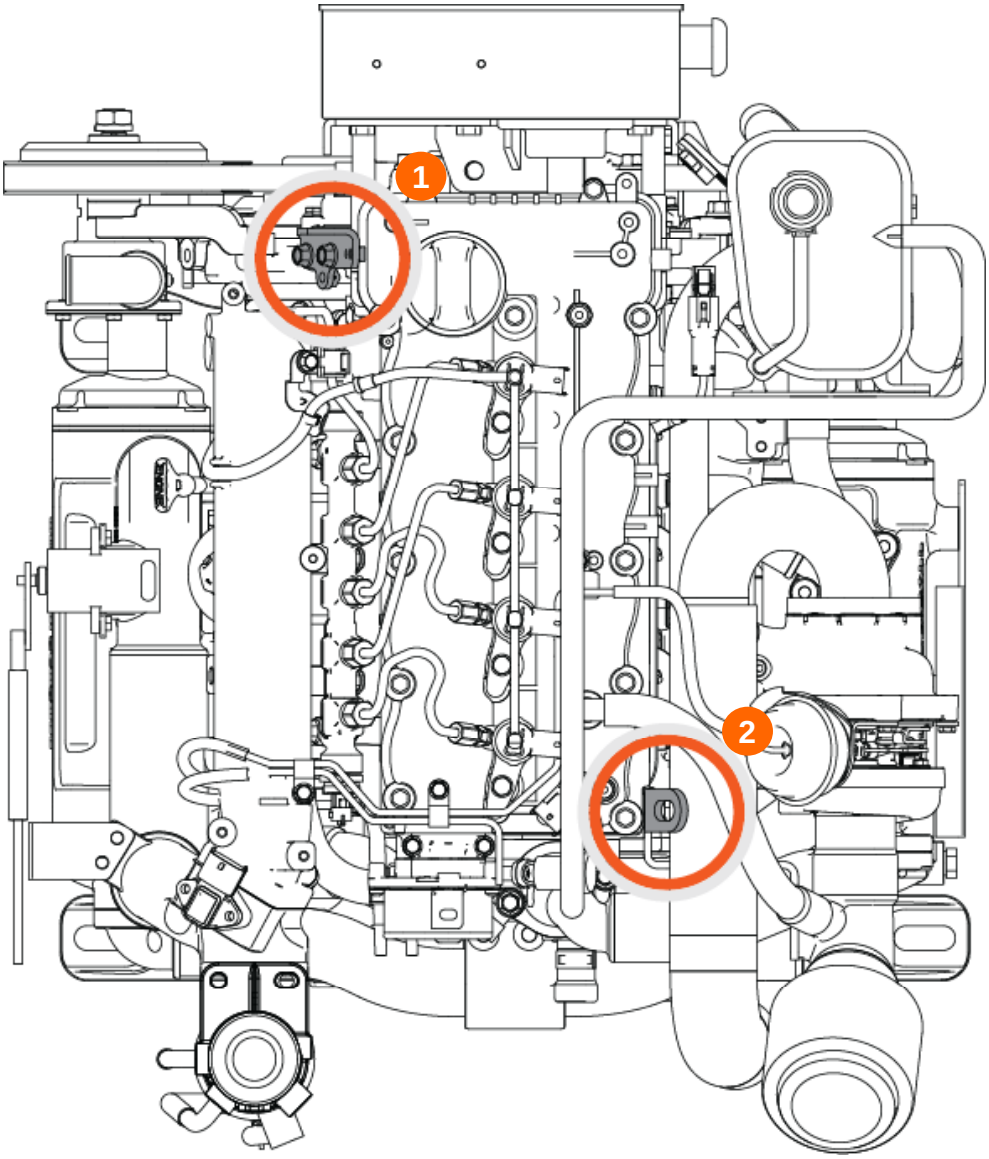
1. ECU Box
2. Engine Oil Cap
3. Engine Oil Filter
4. Seawater Pump
5. Intercooler
6. Engine Oil Gauge
7. Acceleration Lever Sensor
8. Fuel Filter
9. VGT



1. Alternator
2. Oil Extraction Pump
3. Air Filter
4. Engine Oil Exchange Button
5. Engine Emergency Stop Button
6. Injector
7. Shift Plate
8. Turbo Heat Protector
9. Belt-Drive
10. Coolant Expansion Tank

ENGINE SUSPENSION EYES

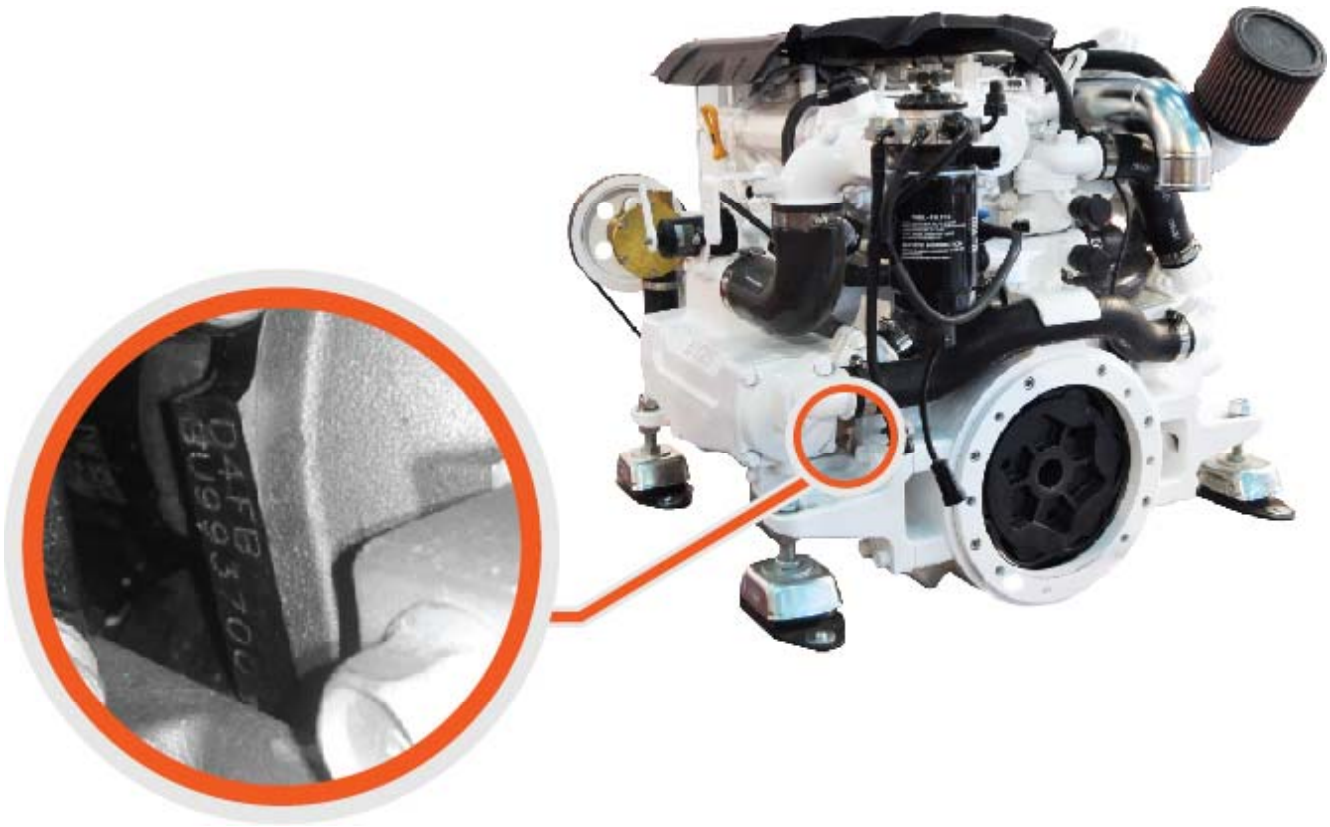
- To lift the engine, first remove the engine cover. You will find two engine eyes (see figure)
- To avoid engine damage, take care that engine lift chains or belts do not hit or touch surrounding parts during engine lifting.
- Use strong enough lift chains or belts to carry the engine weight safely.



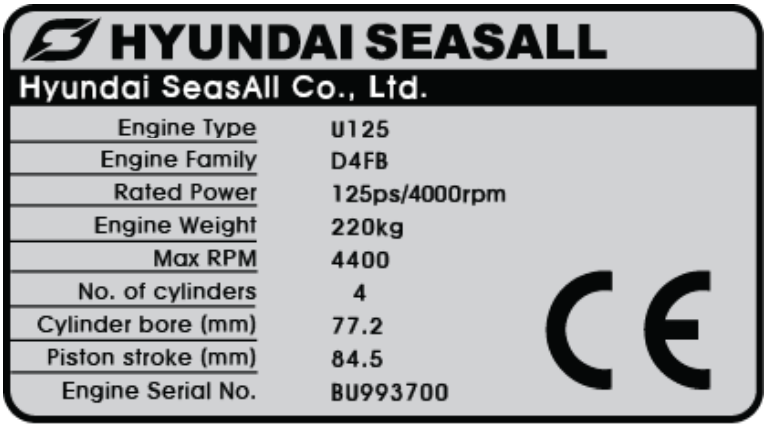
ENGINE IDENTIFICATION

Engine identification is affixed to the engine block and the ECU box (see figure).

▪ **SERIAL NUMBER ON THE ENGINE BLOCK**



• **ENGINE NAME PLATE**

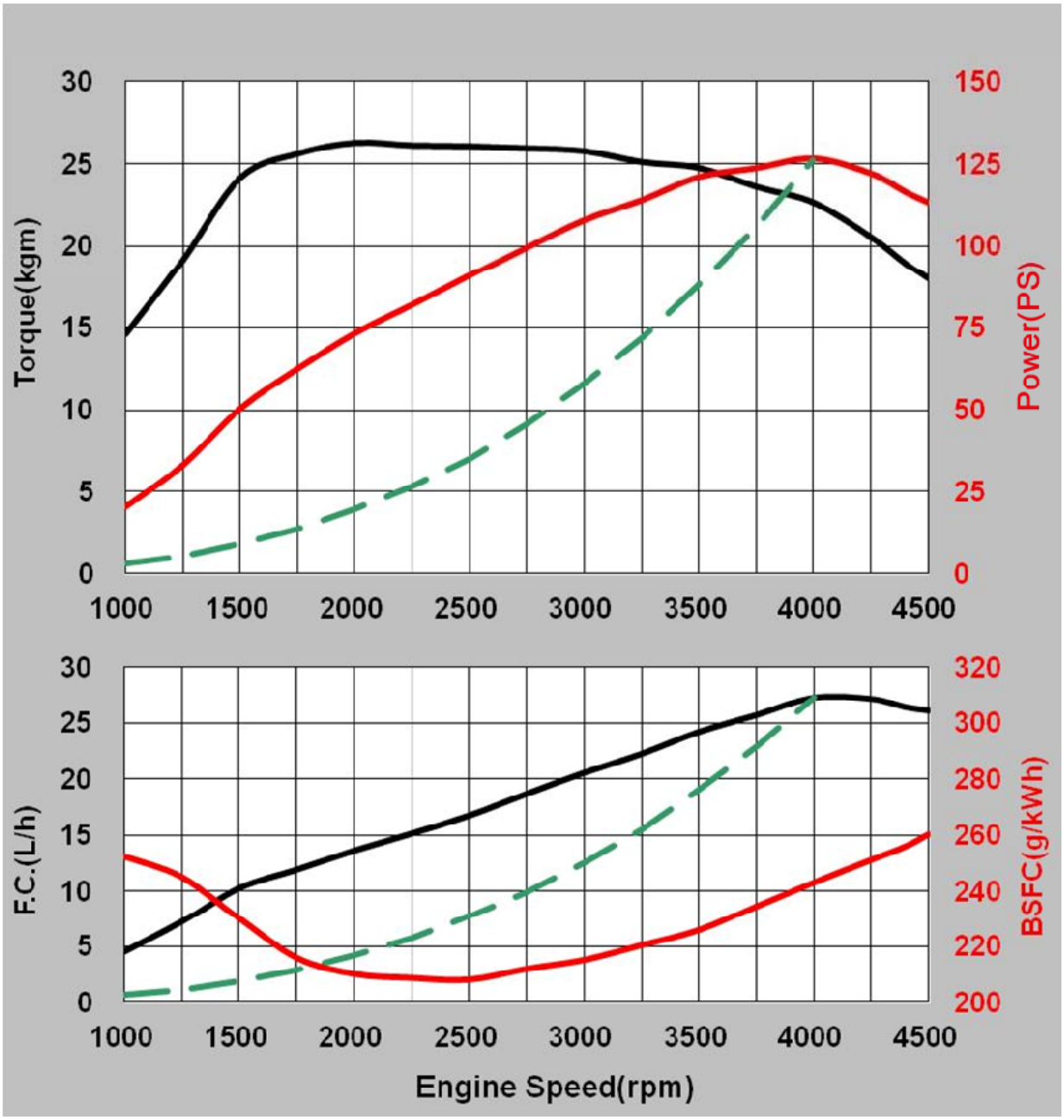


TECHNICAL DATA

Engine type	U125S	U125P	U125J
	4-stroke, 16-valve		
	After-cooled, direct-injection, water cooling		
Output ps (kW)	125ps (93)		
rpm at full load	4000		
Cylinders	In-line 4		
Ignition sequence	1-3-4-2		
Displacement [cm^3]	1,582		
Bore [mm]	77.2		
Stroke [mm]	84.5		
Compression ratio	17.3 : 1		
Max. torque [kgm] @ speed [rpm]	26.3		23.5
	2000		3700
Injection system	Common rail direct injection		
Diesel fuel	at least CN 51 as per DIN EN 590		
Intake air pressure (abs. bar) @ speed [rpm]	2.5 bar @ 4000 rpm		
Coolant quantity (liter)	5.5		
Coolant cap opening pressure (bar)	1.1		
Engine oil (liter)	5.7		
Engine oil pressure (bar)	2~3 at 1800rpm, 100 ℃(oil temp.)		
Exhaust gas pressure (kPa)	Max. 45		
Alternator [A]	130A		
Engine diagnosis	Yes		
Weight (kg)	220		
Battery capacity (AH)	12V, 150AH recommended		
Thermostat opening temp. (℃)	85 (starting to open), 95 (fully open)		
Idle rpm warmed up (rev/min)	730		
Permissible eng. oil temp (℃)	135		
Permissible eng. coolant temp (℃)	104		
Propulsion system	Sterndrive	Shaftdrive	Waterjet

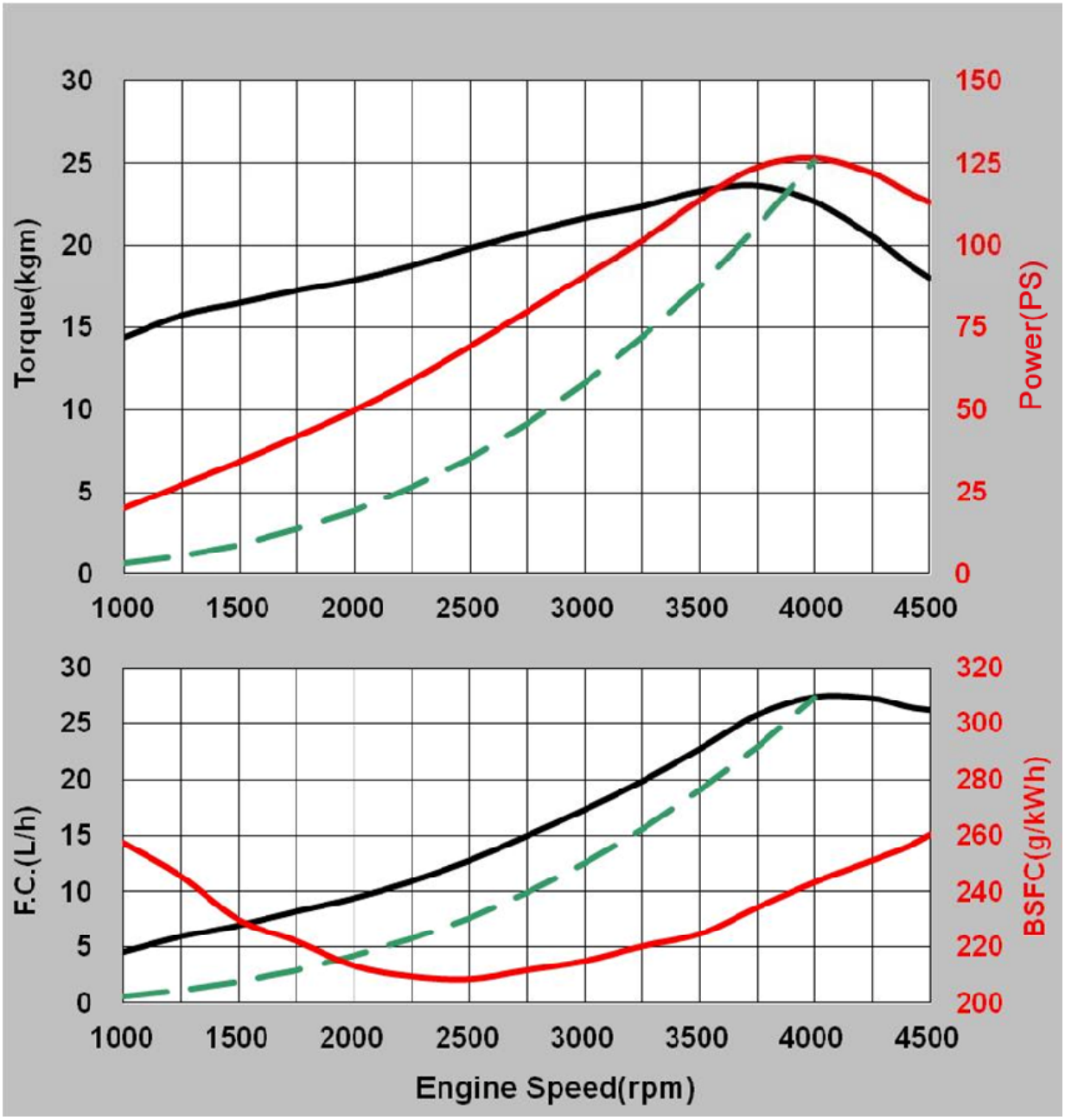
PERFORMANCE CURVE

▪**U125S & U125P MODEL**



*BSFC : Brake Specific Fuel Consumption *FC : Fuel Consumption

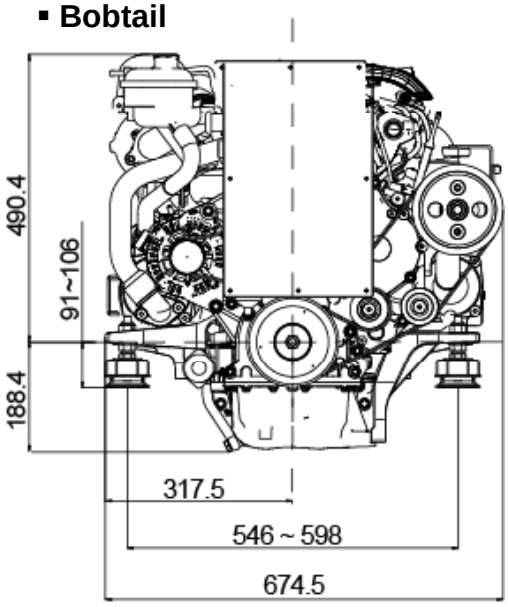
▪**U125J MODEL**



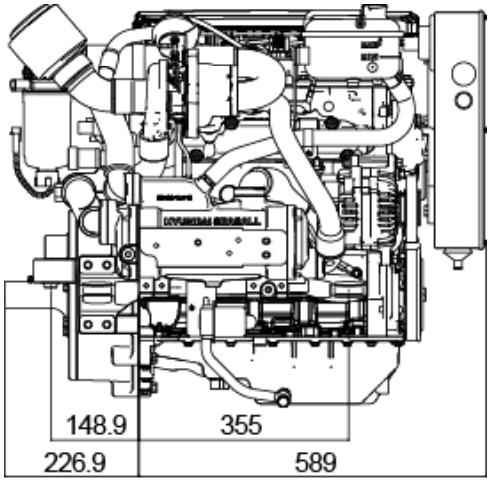
*BSFC : Brake Specific Fuel Consumption *FC : Fuel Consumption

ENGINE DIMENSIONS

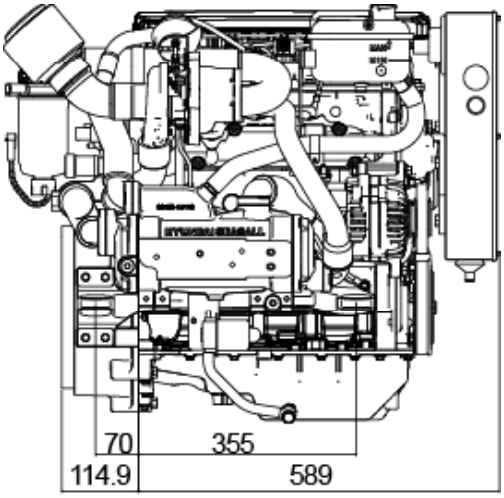
▪ **Bobtail**



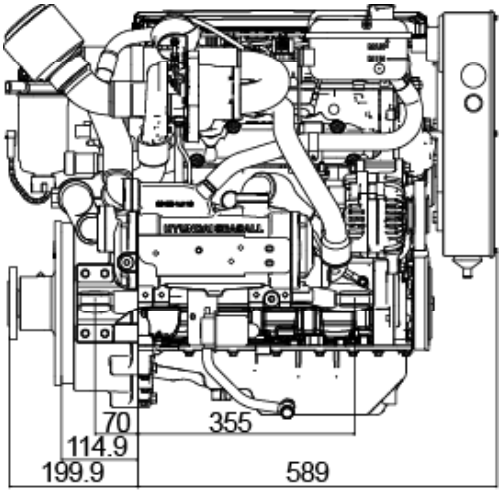
Front view



Side view [for sterndrive]

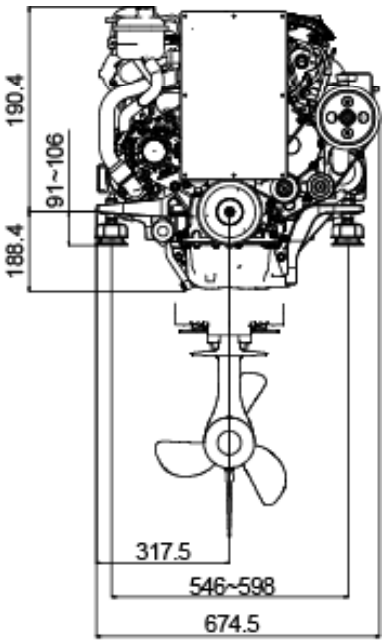


Side view [for shaftdrive]

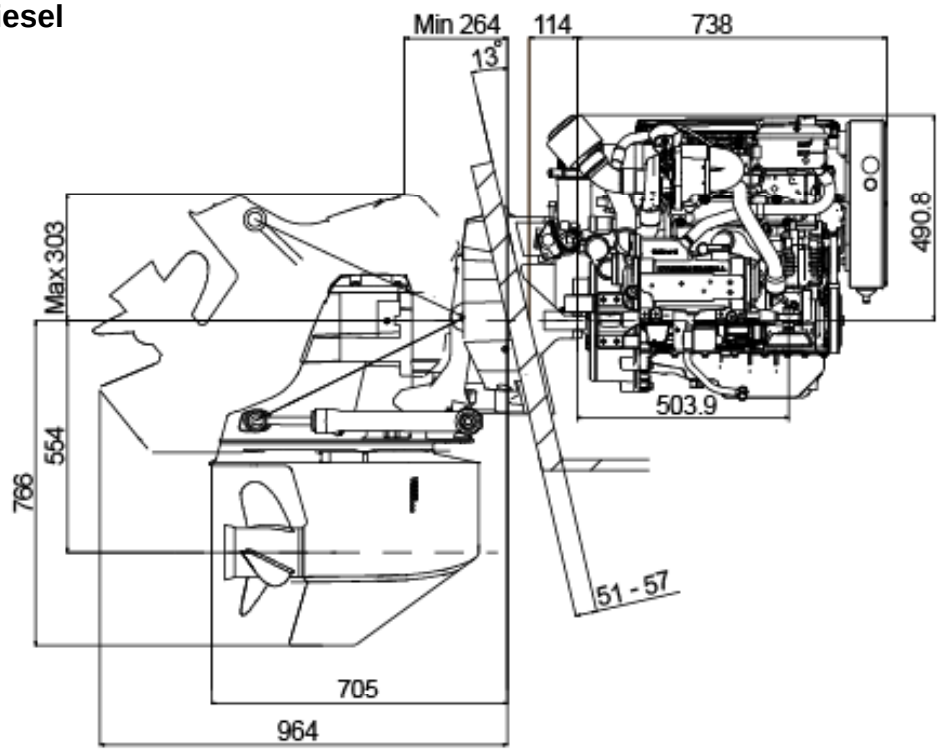


Side view [for waterjet with bearing housing]

▪ **MerCruiser Bravo One X Diesel**

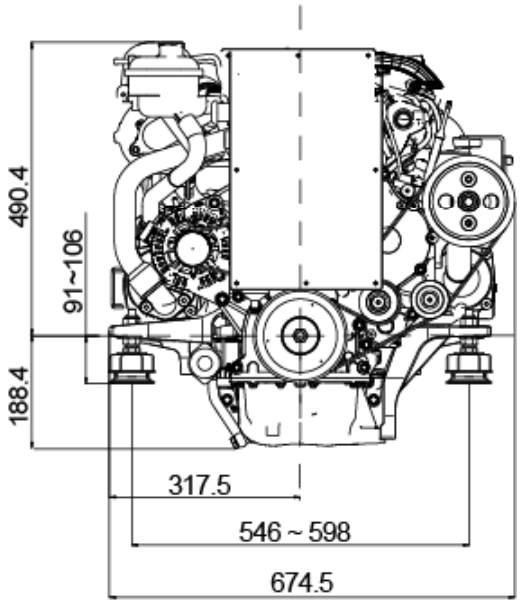


Front view

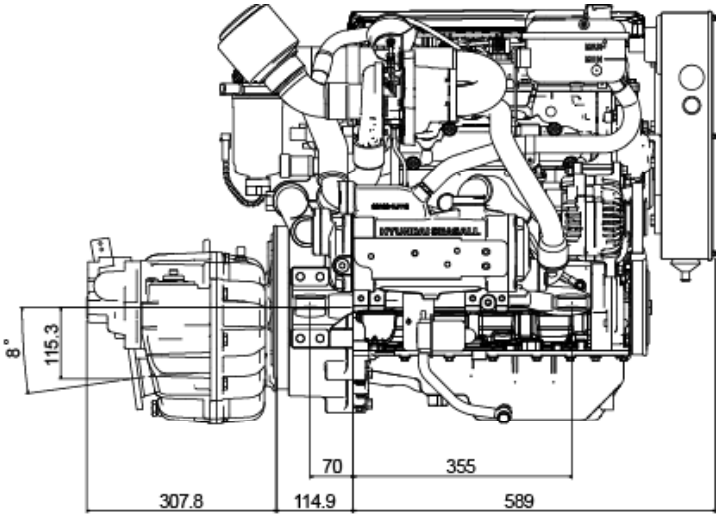


Side view

▪ **ZF 25 A**

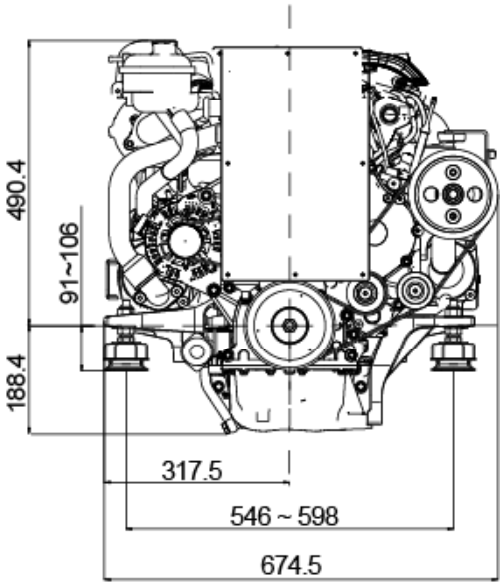


Front view

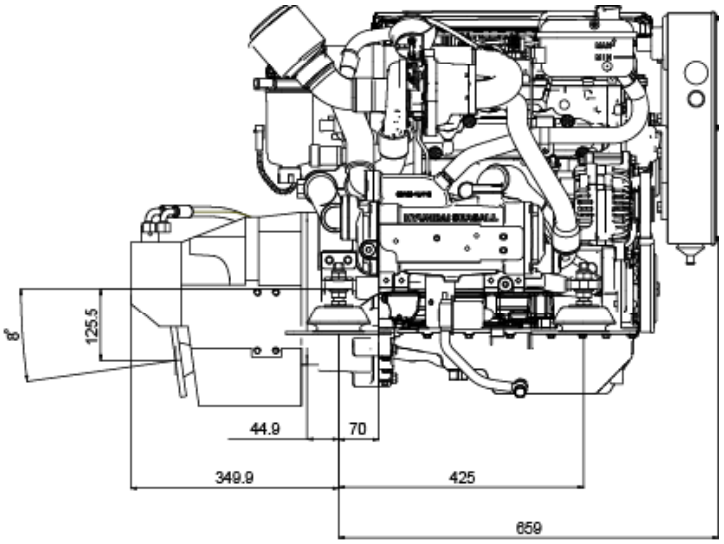


Side view

▪ **ZF 45 A**

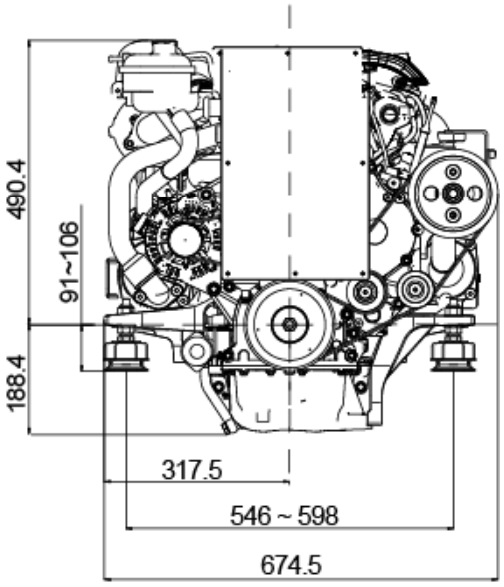


Front view

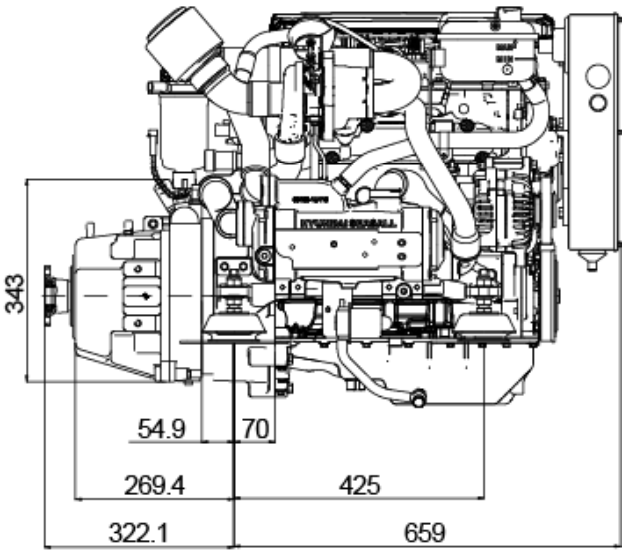


Side view

▪ **ZF 45 C**



Front view



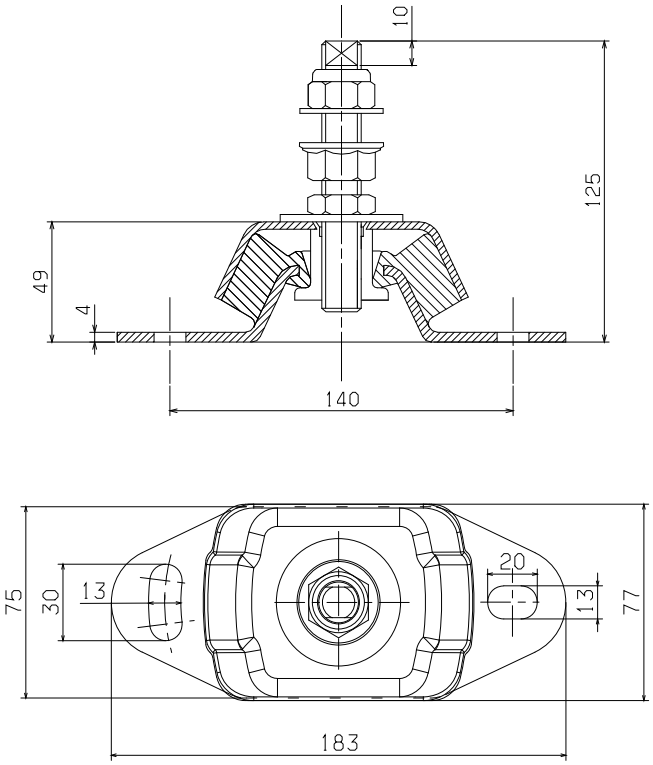
Side view

CHAPTER 2
ENGINE MOUNT SYSTEM

ENGINE MOUNTING REQUIRMENTS

- The mounts must be strong enough to carry the loads applied by the weight and power of the engine. It also must be stiff enough that the engine does not sag or move too much when power is applied.
- The mounts must position the engine at the correct height and angle so that the engine's thrust line suits the boat.

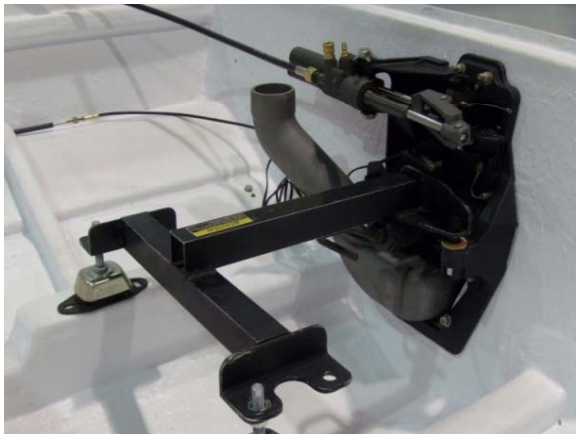
ENGINE MOUNT DIMENSIONS

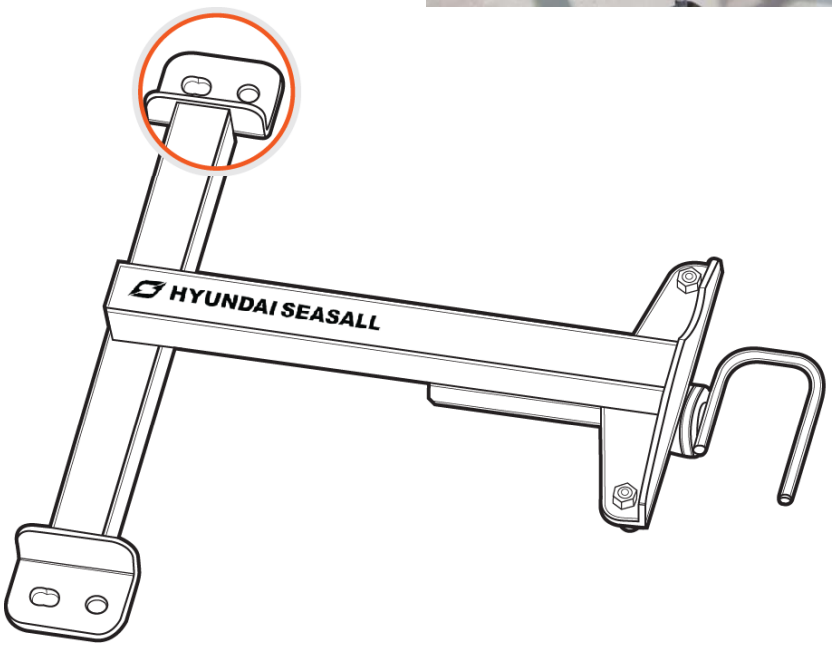


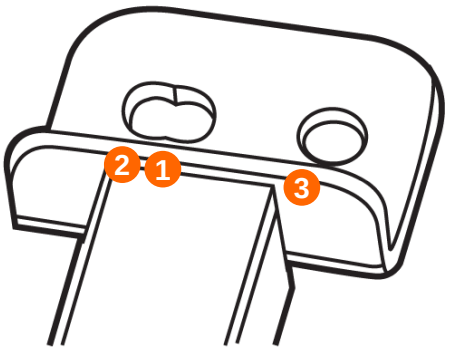
CAUTION

USE ONLY THE ORIGINAL HYUNDAI SEASALL ENGINE MOUNTS THAT WERE SUPPLIED WITH THE INITIAL PURCHASE.
AFTER INSTALLATION AND ALIGNMENT OF THE ENGINE, MAKE SURE THAT NO RESIDUAL TENSION EXISTS IN THE DRIVETRAIN.

ENGINE MOUNT TOOL FOR STERNDRIVE MODEL







1. **Mount hole for U125 model (Back of Rear Hole)**
2. Mount hole for D170 and D150 model (Front of front. Hole)
3. Mount hole for S250 and S220 model

CAUTION

IT IS ESSENTIAL THAT THE ENGINE BED IS PERFECTLY FLAT BEFORE USING ENGINE MOUNT TOOL.
FOR INFORMATION ON INSTALLATION OF THE STERNDRIVE BRAVO MODELS, PLEASE SEE THE SEPARATE BOOKLETS INCLUDED IN THE ORIGINAL PACKAGING OF YOUR HYUNDAI SEASALL PURCHASE.

CHAPTER 3
ENGINE OPERATION

STARTING ENGINE

- Before starting the engine, you should check engine oil, coolant, gearbox oil, fuel gauge, seawater pump, battery, seacocks and so on.

- When you start the engine, check that the engine throttle lever ① is in the neutral position. If not, the engine may not start or there is possibility of the boat moving inadvertently. If your boat is equipped with a neutral safety switch, the engine will only crank when the engine throttle lever is in the neutral position. You can also check this on the EOI.

- After starting the engine, release the key ② immediately to prevent damage to the starter motor.

- Avoid maximum rpm and WOT (Wide Open Throttle) before the cold engine is fully warmed up.

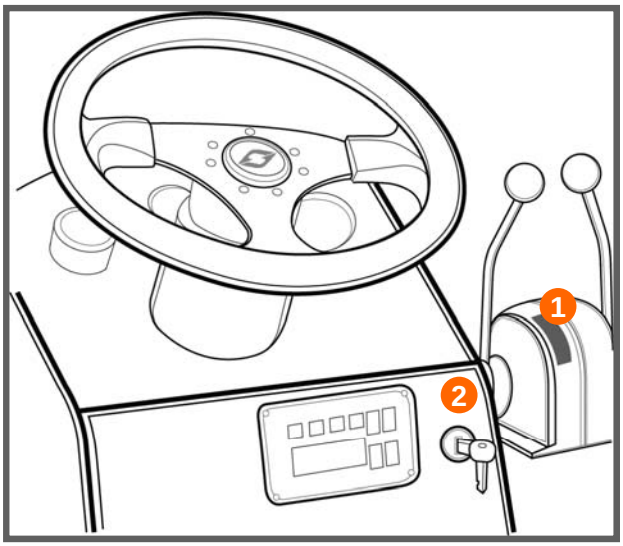
- When cold starting, it may take a few more seconds to start the engine.

- If the engine does not start in 10 seconds, release the key and wait 10 seconds. After 10 seconds try again. This method can help avoid starter motor damage.

STOPPING ENGINE

- The should be run for a few minutes at idle (in neutral) before turning it off. This will avoid boiling and even out the temperature. This is especially important if the engine has been operated at high engine speeds and loads.

- Never switch off the main switches while the engine is running. This could damage some parts like the alternator.



WARNING

**DO NOT DRIVE IN SPACE WHERE THERE IS NO AIR CIRCULATION.
EMISSION GAS IS HARMFUL.**

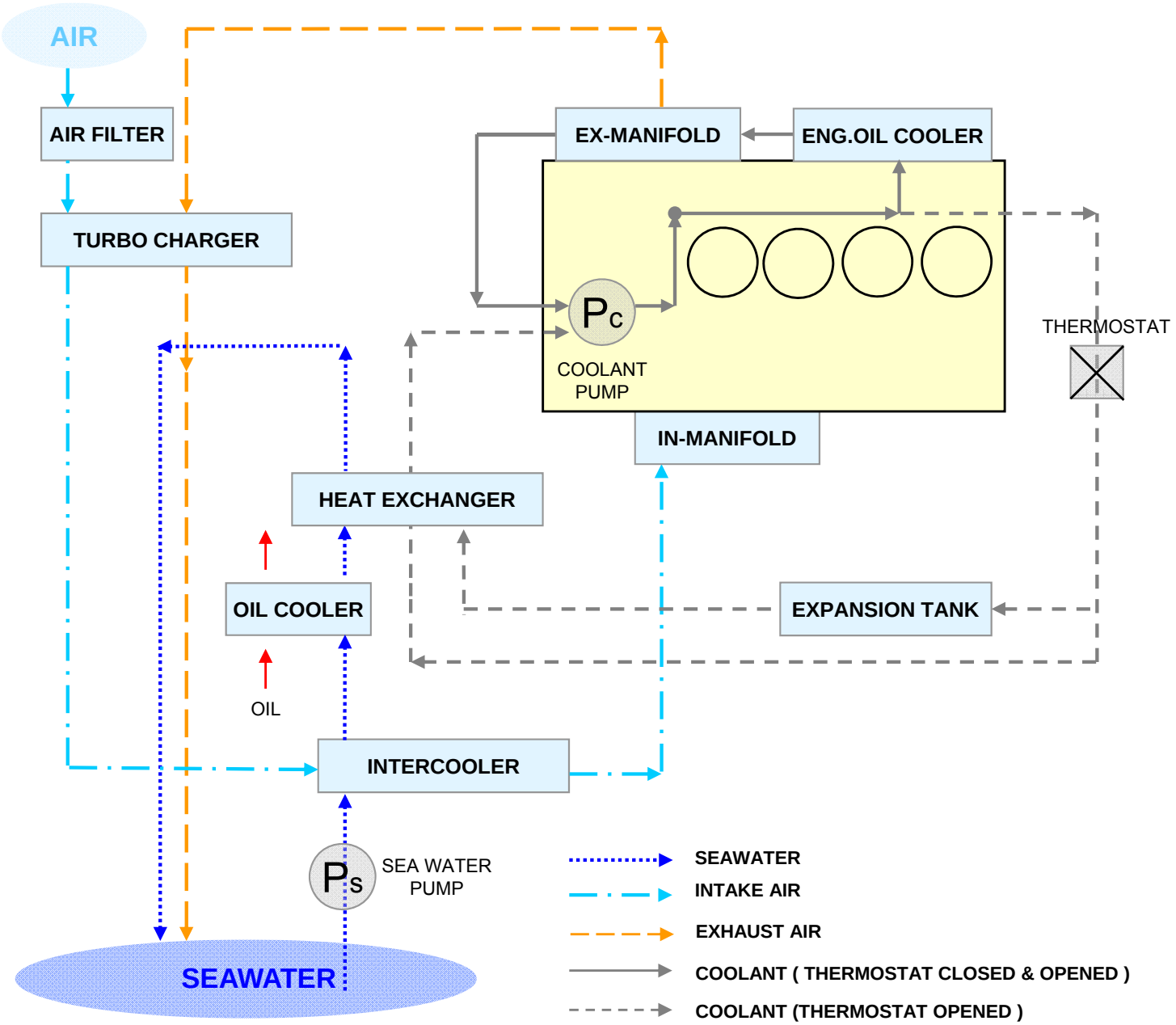
EMERGENCY STOP

- You can stop the engine by pushing this button. After releasing the switch by twisting the button, you can start the engine again. (Normally, the button should be in the “out” position.)
- When the switch is pressed or it doesn’t work normally, the engine doesn’t crank. We recommend that you check this switch first if there is any cranking problem.
- You can use this switch to avoid unexpected engine starting during maintenance.
- You can use this switch in any emergency situation when you want to stop the engine.

WINTER OPERATION AND STORAGE

- When using or storing your engine under 0° C, protect all parts exposed to seawater (seawater pump, intercooler, heat exchanger, cooling lines, seawater strainer, valves and hoses) from freezing. Sterndrive models should be trimmed down fully to prevent trapping water in the gear case which could then freeze and cause damage.
- The battery capacity decreases as the temperature drops. We recommend recharging the battery frequently. Check and clean all battery cable connections, as oxidized connections lead to voltage drops and starting difficulties.
- If water happens to freeze in engine, be sure to examine the engine for broken parts, exchange broken parts if necessary and thaw any frozen water before operating the engine.

SCHEMATIC DIAGRAM OF ENGINE COOLING CIRCUIT



SEAWATER FLOW – OPEN COOLING CIRCUIT

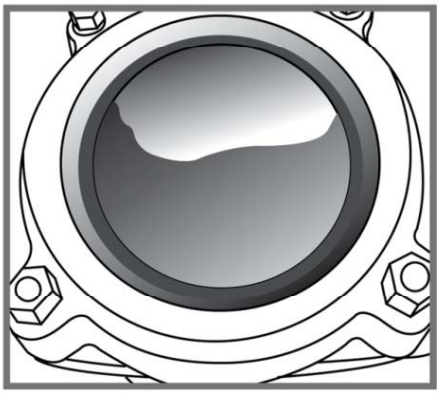
Water strainer ← Water valve ← Water pickup
↓
① Seawater pump
↓
② Intercooler
↓
③ Transmission oil cooler
↓
④ Heat exchanger
↓
⑤ Exhaust elbow
↓
Sea water

WATER PICKUP

- Water pickup should be installed in an area where it won't pick up air bubbles and will access clean water during all phases of the engine operation.
- For use in sterndrive models, please see the section "Installing Sterndrive Seawater Pickup" of the BRAVO MODELS INSTALLATION MANUAL, included in the original packaging.
- For further safety, you can use an additional transom or bottom mounted clamshell-type water pickup.

WATER STRAINER

- Strainer should be located in an area where it will be easily accessible for periodic seawater flow inspection and cleaning.
- The size of strainer must be of sufficient capacity to pass the seawater (a flow rate over 150 liters per minute flow rate).
- Strainer must be installed after water inlet valve in order to allow user to shut off seawater when cleaning strainer filter.



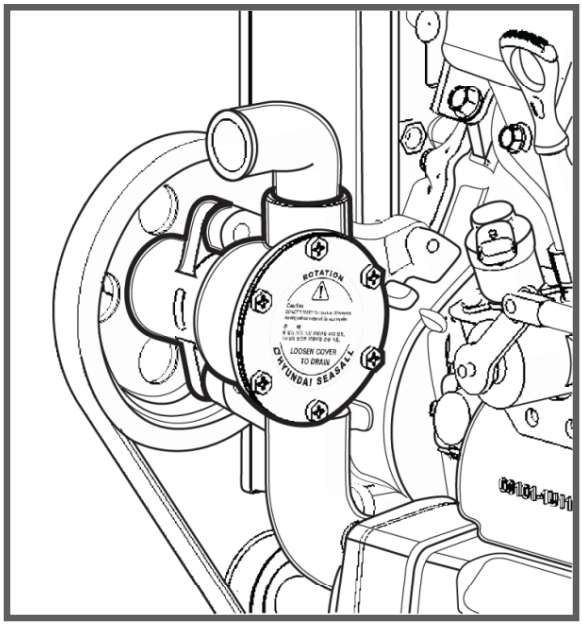
CAUTION

IF THE SEAWATER STRAINER IS NOT PROPERLY ASSEMBLED, AIR CAN BE SUCKED INTO THE COOLING CIRCUIT, DISTURBING THE VACUUM PROCESS. THIS CAN CAUSE THE ENGINE TO OVERHEAT.

CLEAN STRAINER FILTER

- Stop the engine and close the water valve.
- Remove the filter cap.
- Remove the filter element, flush it thoroughly with clean water or compressed air.
- Insert the cleaned filter element and screw on the filter cap.
- Check the cap and the gasket for correct seating and sealing.
- Open the water valve.
- Start the engine and check if there is water leakage.

SEAWATER PUMP



- The internal diameter of hose connected to seawater pump inlet should be 32mm.
- The cross section of the hose may shrink due to inlet pressure drop. Therefore, the hose from water pickup in the boat's hull to the seawater pump inlet should be as short as possible and must be made of steel wire reinforced material.
- The seawater pump impeller must be checked periodically and replaced if necessary.

CAUTION

IF ASSEMBLY IS NOT CONDUCTED PROPERLY, AIR CAN BE SUCKED IN, DISTURBING THE VACUUM PROCESS. THIS CAN CAUSE THE ENGINE TO OVERHEAT.

CHECKING SEAWATER PUMP & IMPELLER

- Stop the engine and close the water valve.
- Remove the impeller housing cover.
- Remove the impeller from inside the seawater pump.
- Check the condition of impeller and bushing.
- Apply soapy water to impeller when assembling, and reassemble towards rotation direction.
- Replace of the O-ring on the impeller housing cover.
- Open the water valve.
- Start the engine and check if there is water leakage.

CAUTION

DO NOT RUN THE ENGINE WITHOUT SEAWATER. THE SEAWATER PUMP IMPELLER WILL BE DAMAGED. BEFORE STARTING THE ENGINE, BE SURE TO SUPPLY SEAWATER TO THE PASSAGES.

CAUTION

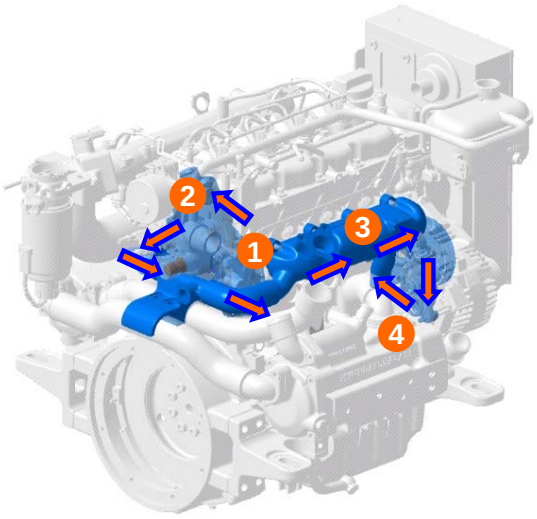
IMPELLER DAMAGE MAY OCCUR IF APPROPRIATE TOOLS ARE NOT USED WHEN REMOVING THE IMPELLER. MAKE SURE TO CHECK O-RING CONDITION AFTER SEAWATER PUMP REASSEMBLY.

CAUTION

DO NOT INSTALL ADDITIONAL DEVICES WHICH COULD OBSTRUCT THE FLOW OF SEAWATER. THIS CAN CAUSE THE ENGINE TO OVERHEAT.

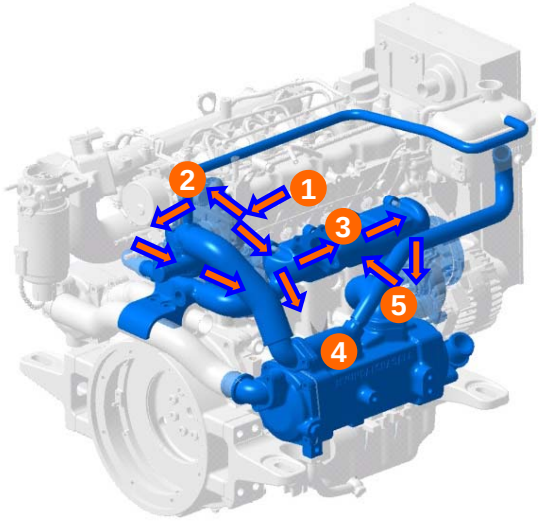
ENGINE COOLANT FLOW

▪ THERMOSTAT CLOSED



1 Engine coolant outlet
↓
2 Engine oil cooler
↓
3 Exhaust manifold
↓
4 Engine coolant inlet

▪ THERMOSTAT OPENED

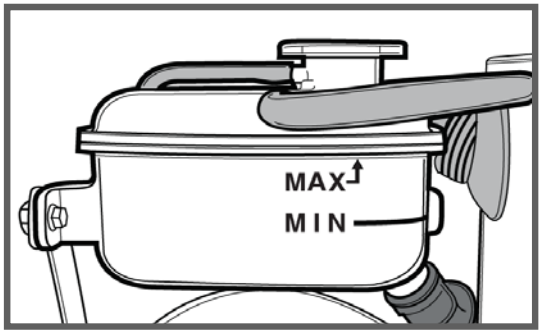


1 Engine coolant outlet
↓
Thermostat opened
(opening temp 85℃)
↓
Expansion tank
↓
4 Heat exchanger
↓
5 Engine coolant inlet

2 Engine oil cooler
↓
3 Exhaust manifold

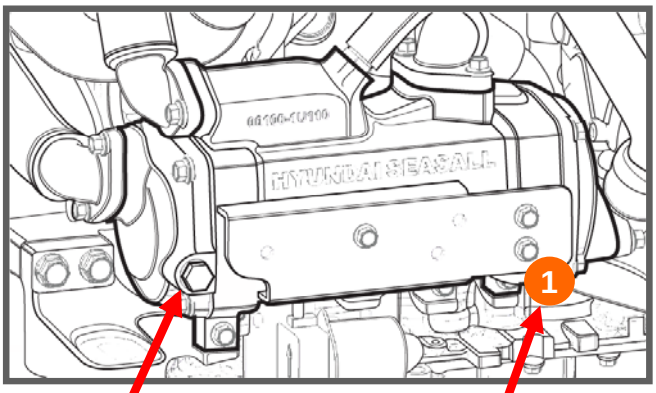
ENGINE COOLANT

- The high-pressure cooling system has a reservoir filled with year-round antifreeze coolant. The reservoir is filled at the factory.
- The coolant level should be between MAX and MIN marks on the side of the coolant reservoir when the engine is cool.



- If the coolant level is low, add enough specified coolant to provide protection against freezing and corrosion. Bring the level to MAX, but do not overfill.
- If frequent additions are required, see an authorized dealer for a cooling system inspection.
- Use only soft (demineralized) water in the coolant mixture.
- The engine has aluminum engine parts and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.
- DO NOT USE alcohol or methanol coolant or mix them with the specified coolant.
- DO NOT USE a solution that contains more than 60% antifreeze or less than 35% antifreeze, which would reduce the effectiveness of the solution.
- For mixture percentages, refer to the following table:

Ambient Temperature	Mixture Percentage (volume)	
	Antifreeze	Water
-15℃ (5˚F)	35	65
-25℃ (-13˚F)	40	60
-35℃ (-31˚F)	50	50
-45℃ (-49˚F)	60	40



- In order to drain engine coolant, use a screwdriver to loosen the drain plug ①.
- The drain plug is located under the heat exchanger unit.

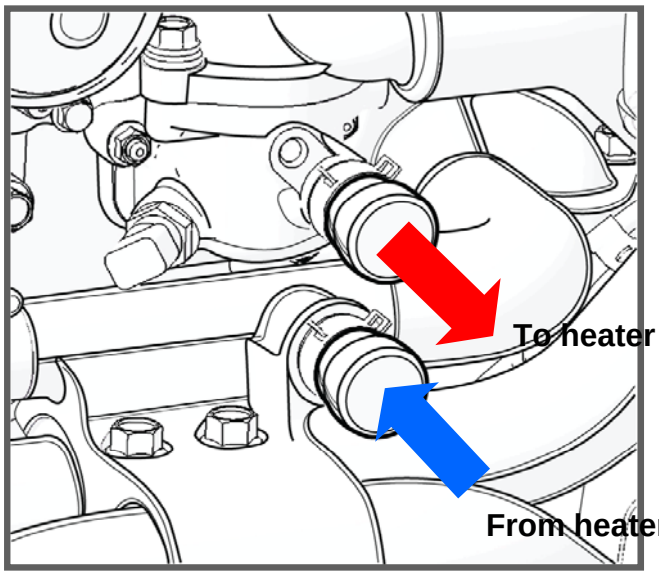
REMOVING AIR BUBBLES IN COOLANT

- Start the engine and warm it up at a low rpm.
- Stop the engine and allow the engine to cool, and then open the cap of the expansion tank carefully.

  *NOTE: Never open the cap when the engine is hot. It may cause scalding.
- Refill with coolant if needed.
- Reinstall the expansion tank cap
- Check the level of the expansion tank regularly.

CABIN HEATER CONNECTION

- In order to use a cabin heater, an extra coolant circulation pump is needed.
- After connecting cabin heater lines, engine coolant must be refilled and checked.
- Please check coolant flow direction, as shown in the drawing.
- Outer diameter of connection port is Ø17.3 mm



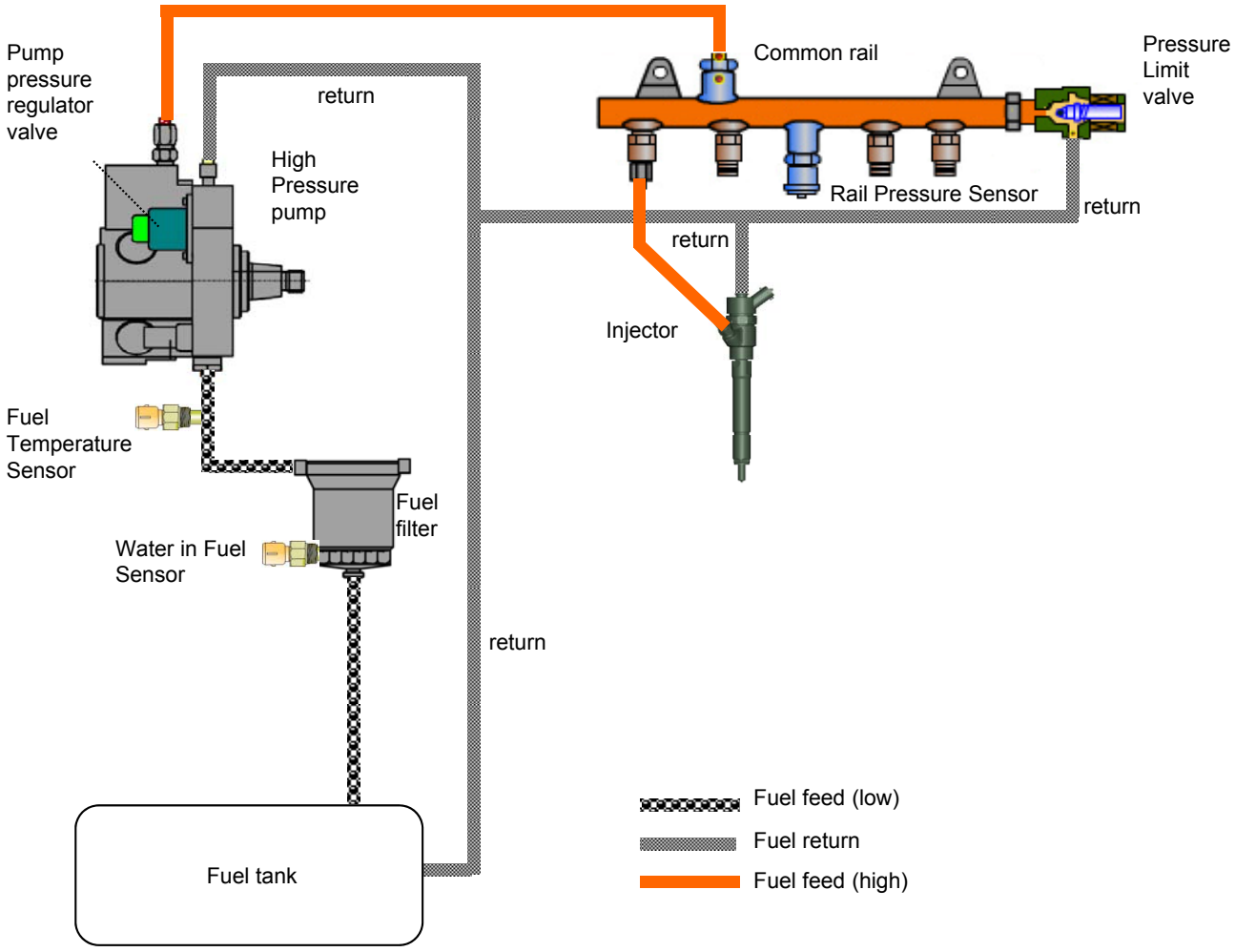
* Outer diameter of line is Ø19.1 mm

WARNING

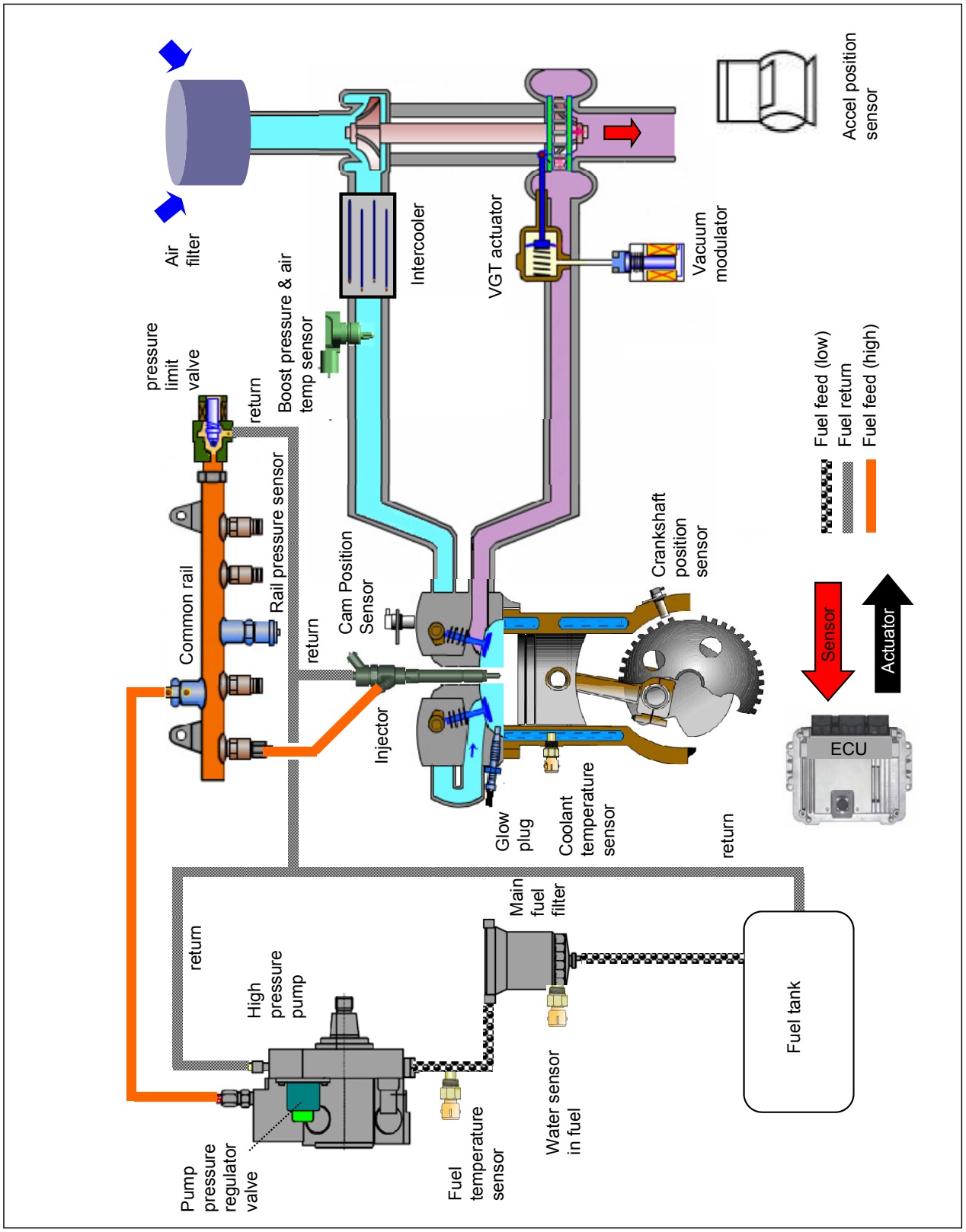
NEVER OPEN THE EXPANSION TANK CAP WHEN THE ENGINE IS OPERATING OR HOT. IT COULD RESULT IN SERIOUS PERSONAL INJURY AND MAY CAUSE ENGINE DAMAGE.

CHAPTER 5
FUEL SYSTEM

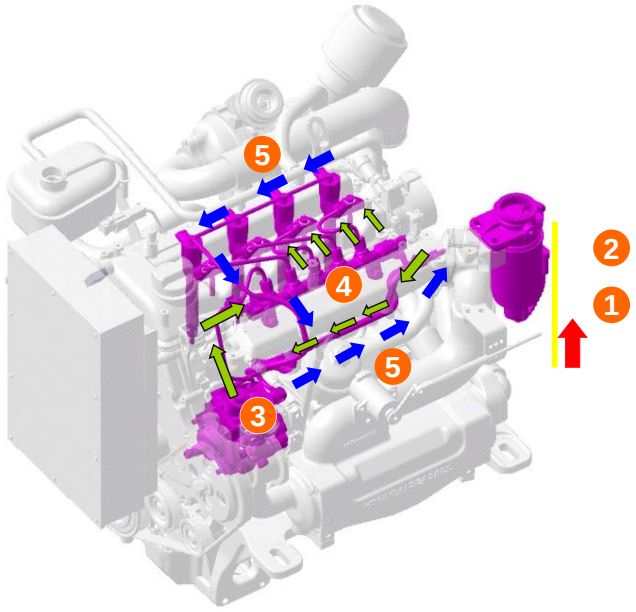
The fuel supply system of this engine is diesel common rail direct injection. In order to optimize engine combustion, maximum injection pressure is up to 1600 bar. Multi-injection is possible thanks to the quick response of the solenoid type injector.



SCHEMATIC DIAGRAM OF COMMON RAIL DIESEL ENGINE

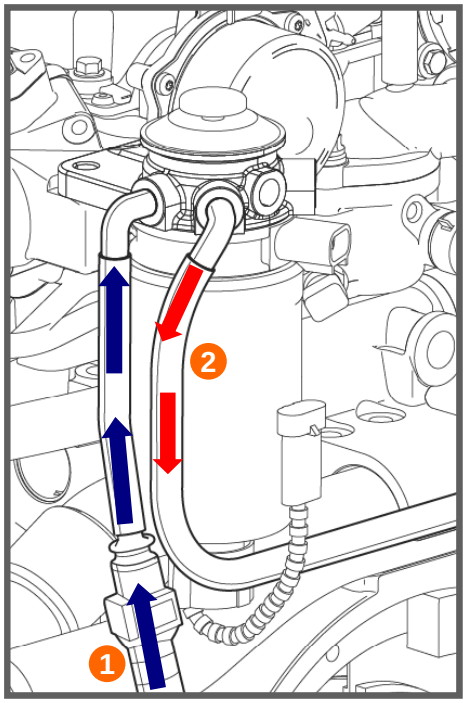


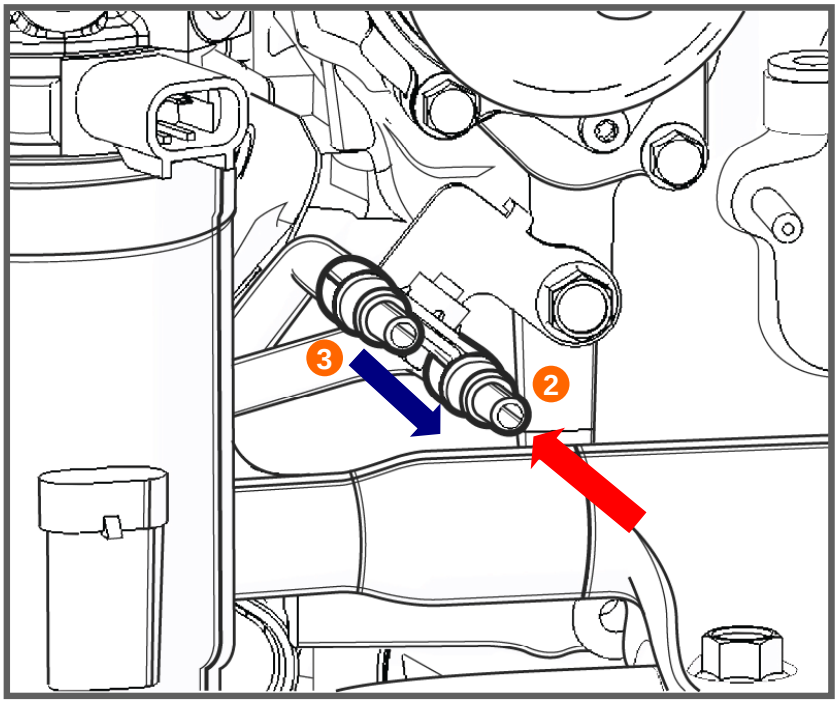
FUEL FLOW



Fuel tank
↓
Auxiliary fuel filter
↓
1 Fuel filter (low pressure)
↓
2 Fuel filter with water detection sensor
↓
3 High pressure pump
↓
4 Common rail
↓
5 Injector or return to fuel tank

LOW PRESSURE FUEL LINE



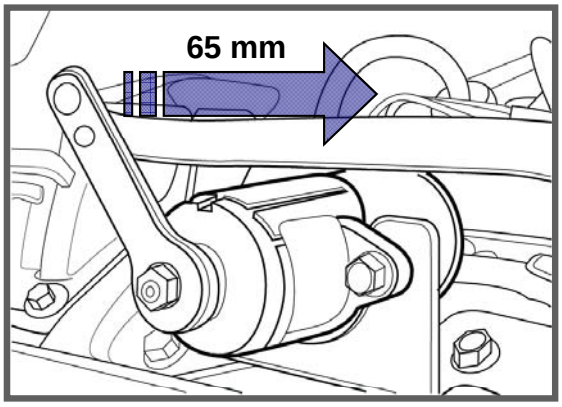


① Feeding line from fuel tank to fuel filter
② Feeding line from main fuel filter to high pressure pump
③ Return line to fuel tank (engine out)

※ The internal diameter of all fuel lines must be at least 8 mm.

ACCELERATION SENSOR AND CONTROL LEVER

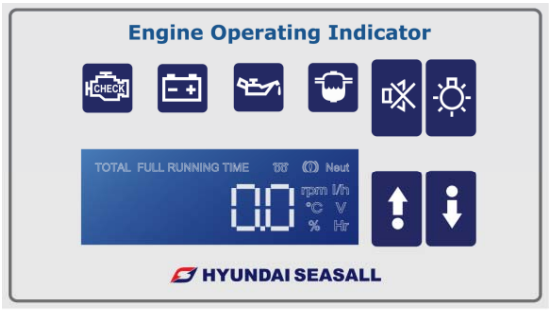
When installing control lever cable to acceleration sensor, be sure that the acceleration sensor lever is fully released at the idle position and fully pulled to the full-load position. The swing distance of the lever between idle and full-load position is 65mm.

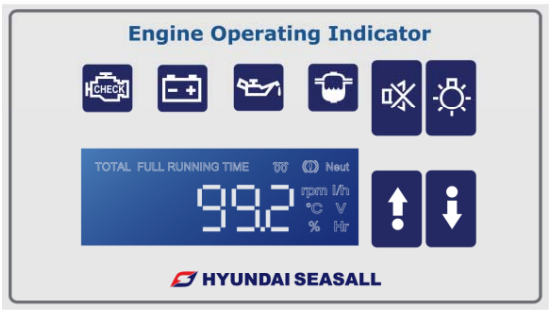


The procedures for control lever installation

1) Idle position setting
   Make sure that the position value (%) indicates 0% in neutral condition.

2) Full load position setting
   Make sure that the position value (%) indicates full load range(90~99.2%) at fully forward lever position. If not, disassemble and adjust the base neutral position of the control lever by moving it to the rear until the condition are met.





CAUTION

YOU SHOULD PERFORM ABOVE PROCEDURES AFTER CONTROL LEVER INSTALLATION WITH THE ENGINE NOT RUNNING BUT WITH THE IGNITION KEY ON.

RECOMMENDED FUEL QUALITY

The following fuels should be used for engine operation:

- Standard summer / winter diesel fuel according to DIN EN 590 (classes A-F)
- Diesel fuel according to DIN EN 590 (classes 0-4) in arctic climates
- Summer diesel fuel according to California and U.S. federal regulations
- Winter diesel fuel if lubricity is comparable to diesel fuel according to DIN EN 590
- Mixture of diesel fuel with 5 Vol.% RME according to DIN 51606
- Later admixing or additional use of additives, gasoline or special fuels is not permitted

DRAINING WATER FROM FUEL FILTER

- The fuel filter for a diesel engine plays an important role of separating water from fuel and accumulating the water in its base. If water accumulates in the fuel filter, a warning light comes on when the ignition switch is at the ON position.
- If the water in the fuel filter is over the limit, the Water Sensor Lamp on the EOI will light up. If this happens, you must stop the engine and drain the water in fuel filter yourself or ask the nearest workshop to do this.
- Water and a little fuel will drain at the same time.

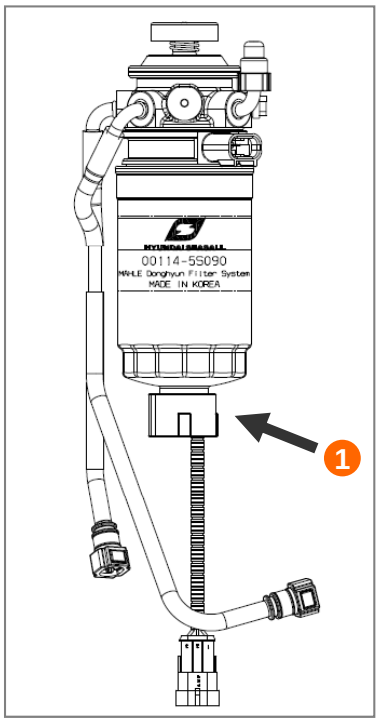
  Therefore, avoid flames in your workspace.
- If your fuel is not well suited to your engine, more frequent

  drainage will be required.
- To check and drain the water in fuel filter:

  ① Loosen the drain plug (part ①) and drain water. 100 ~ 120cc drainage is proper.

  ② After water is drained, securely tighten the drain plug.

  ③ After starting the engine, check to make certain the fuel filter warning light is off.



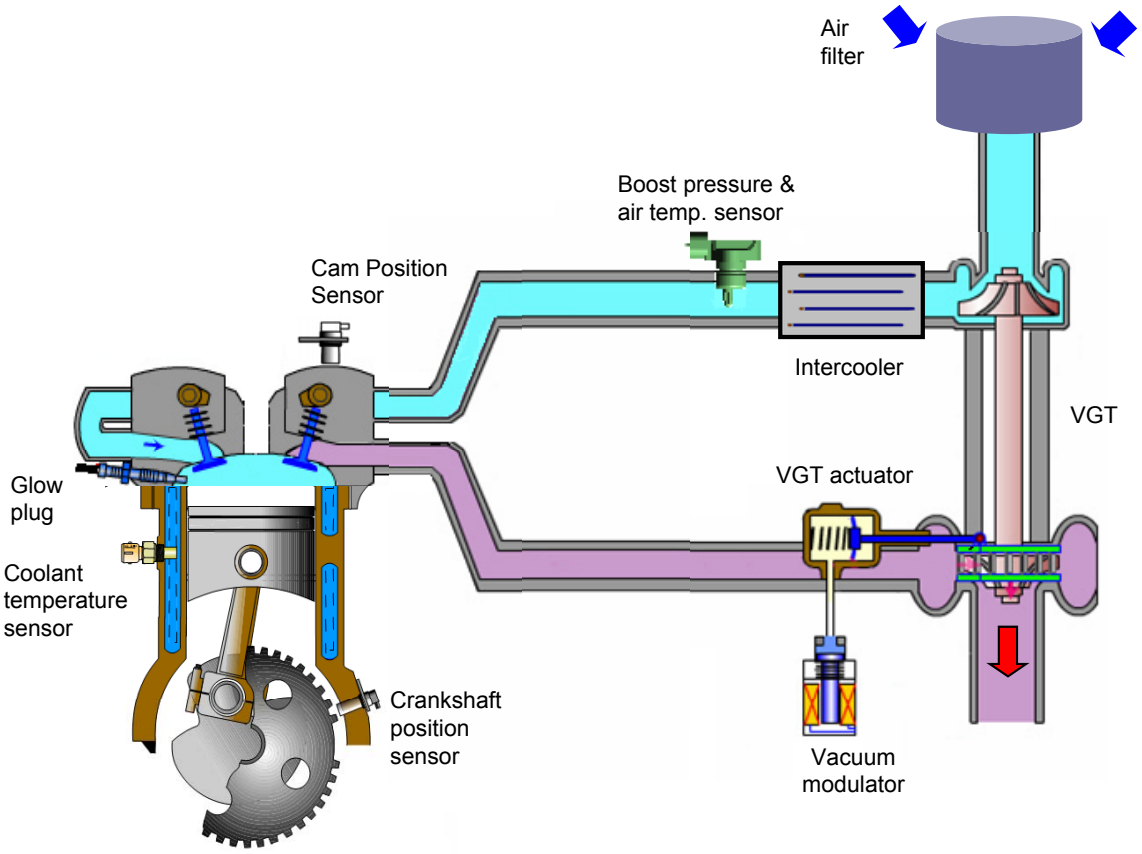
CAUTION

HYUNDAI SEASALL'S GUARANTEES OR WARRANTIES ARE VOID IN CASES WHERE DAMAGE TO FUEL INJECTON COMPONENTS (HIGH PRESSURE PUMP, INJECTORS, ETC.) CAN BE ATTRIBUTED TO THE USE OF UNQUALIFIED FUELS.

IF WATER ACCUMULATED IN THE FUEL FILTER IS NOT DRAINED AT PROPER TIMES, DAMAGE TO MAJOR ENGINE PARTS MAY OCCUR. WHEN REPLACING THE FUEL FILTER CARTRIDGE, USE ONLY GENUINE HYUNDAI SEASALL PARTS.

CHAPTER 6
AIR INTAKE SYSTEM

The intake air system of this engine is optimized by VGT and a highly efficient intercooler system. The pressure of the air system is up to about abs. 2.5 bar in order to optimize engine combustion.



ENGINE ROOM VENTILATION

- Engines with turbocharged air inlet systems require much more cool fresh air than non-turbocharged engines.

  (Maximum air consumption is 460kg/h, minimum engine room vent area is 35cm2.)

- The fresh and cooled air must be pumped into the engine in order to perform at normal power and fuel consumption.
- The temperature at the air inlet should be as low as possible. A high temperature of inlet air may reduce engine performance.

CHECK AIRFILTER

- The original Hyundai SeasAll air cleaner may be cleaned and reused.
- If the air filter is very dirty, it can reduce flow of air to the engine. This can result in reduced power and fuel efficiency.
- Cleaning the air filter should be carried out periodically according to the procedure below.
- Do not clean the filter element with gasoline or other solvent cleaners.

CLEANING AIRFILTER

- Remove the air filter from engine.
- Put the air filter on a flat surface and shake the dust out.
- Liberally spray K&N Air Filter Cleaner onto both sides the of filter and allow to soak for 10 minutes to loosen the dirt.
- Wash out the dust with low pressure running water from the inside toward the outside.
- Dry the wet air filter in the shade for 2 ~3 hour. You can reduce drying time by blowing with a hair dryer on COLD or by blowing with low pressure compressed air.

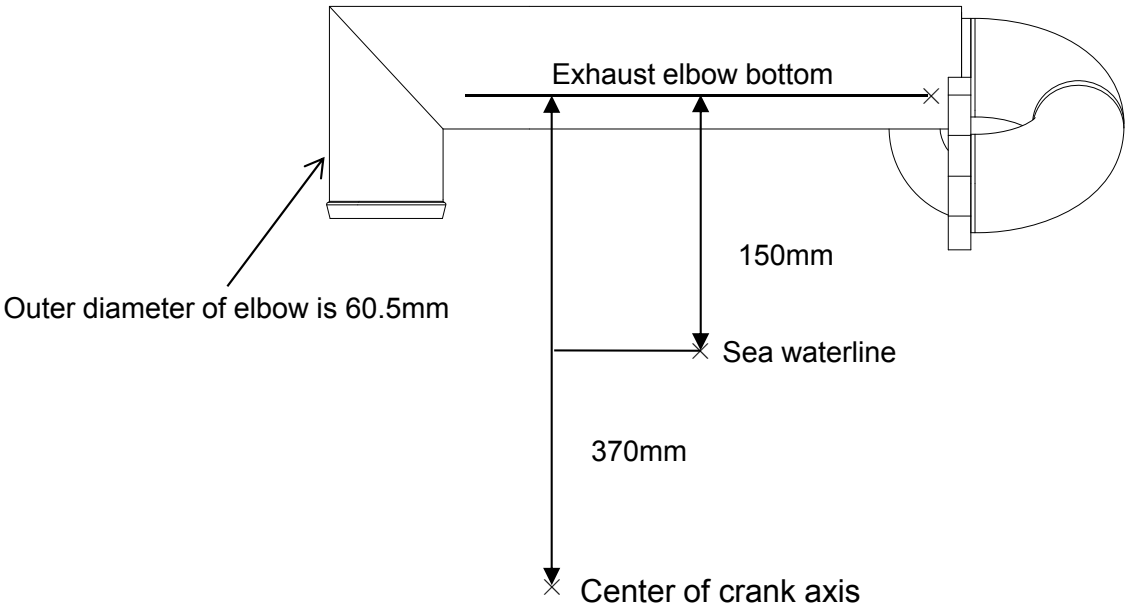
  (CAUTION) Do not use high pressure air, high pressure water or hot air to clean and/or dry the air filter. These can damage the performance of the air filter.
- Apply air cleaner oil over the outside of the filter. If too much oil is applied, it will reduce performance.
- Reassemble air filter to engine.

CAUTION

WHEN REMOVING THE AIR FILTER, BE CAREFUL THAT DUST OR DIRT DO NOT ENTER THE AIR INTAKE, OR DAMAGE MAY RESULT. AND DO NOT RUN WITHOUT AIR CLEANER. THIS COULD RESULT IN EXCESSIVE ENGINE WEAR.
USE OF NON-GENUINE PARTS COULD DAMAGE THE TURBO CHARGER OR ENGINE.

EXHAUST SYSTEM

- Your Hyundai SeasAll engine's exhaust system consists of a coolant-cooled exhaust manifold and a seawater-cooled exhaust elbow (water injected wet exhaust system).
- The vessel's exhaust line should not be made too long and should be as straight as possible. The maximum back pressure of the exhaust gas should be under 350 mbar.
- Make sure that the shortest height between bottom of the exhaust elbow and the center of the crank axis is 370 mm.
- If the distance between the bottom of the exhaust elbow and the waterline is less than 15cm, or if the waterline is above the water injection point, there is a risk of flowing back (siphoning by engine stopping and outside seawater entering through the transom exhaust hole).
- In order to avoid this risk, an air ventilation unit and exhaust riser are needed. If in doubt about exhaust system installation, please contact your nearest Hyundai SeasAll dealer.



CAUTION

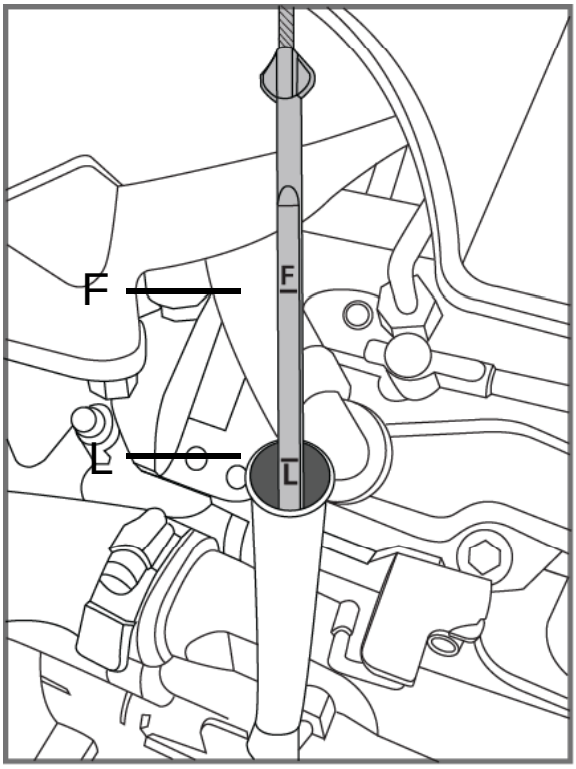
IF IN DOUBT ABOUT EXHAUST SYSTEM INSTALLATION, PLEASE CONTACT YOUR NEAREST HYUNDAI SEASALL DEALER.

CHAPTER 7
LUBRICATION SYSTEM

ENGINE OIL LEVEL CHECKS

The engine oil level must be checked at regular intervals.

- Be sure the boat is level.
- Start the engine and allow it to reach normal operating temperature.
- Turn the engine off and wait about 5 minutes, until the oil has returned to the oil pan.
- Pull the dipstick out, wipe it clean, and re-insert it fully.
- Pull the dipstick out again and check the level. The level should be between F and L. If it is near or at L, add enough oil to bring the level to F. Do not fill with engine oil above the F mark.



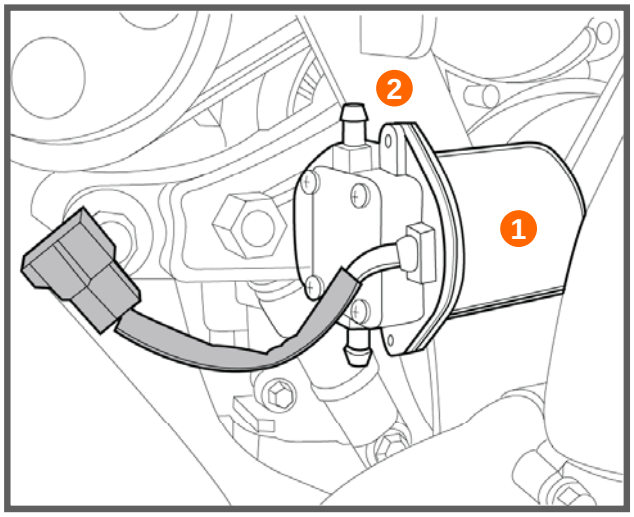
RECOMMENDED OIL QUALITY

For best performance and maximum protection during all types of operation, select only those lubricants which :

- Satisfy the requirement of the API or ACEA classification.
- Have the proper SAE grade number for the expected ambient temperature range.

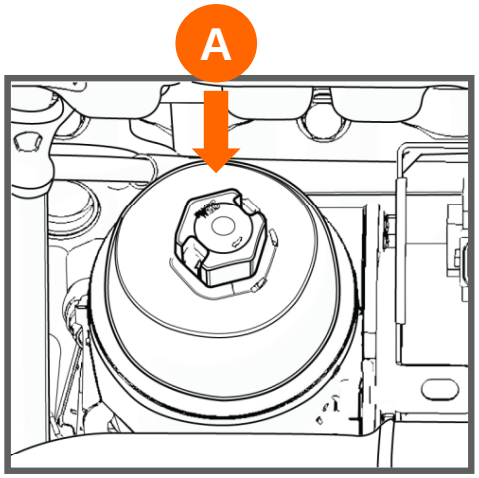
Description		Specifications	Limit
Oil quality	ACEA	Above B4	Service oil quality should conform to ACEA or API classification.
	API	Above CH - 4	
	SAE	15W-40	-15˚C above
		10W-30	-20˚C ~ 40˚C
		5W-30	-25˚C ~ 40˚C
		0W-30	10˚C below

ENGINE OIL EXTACTION PUMP



- Allow the engine to warm up at least 5 minutes.
- Remove the engine oil inlet cap and oil filter.
- The oil drain hose is connected to the oil extraction pump ①, route the loose end of the hose into the container being used for the oil change②.
- Turn the ignition key on (but do NOT start the engine) then press and hold the button ③ on the side of the ECU box with the ignition switched on until the engine oil (about 6 liters) is completely pumped out.

OIL FILTER REPLACEMENT



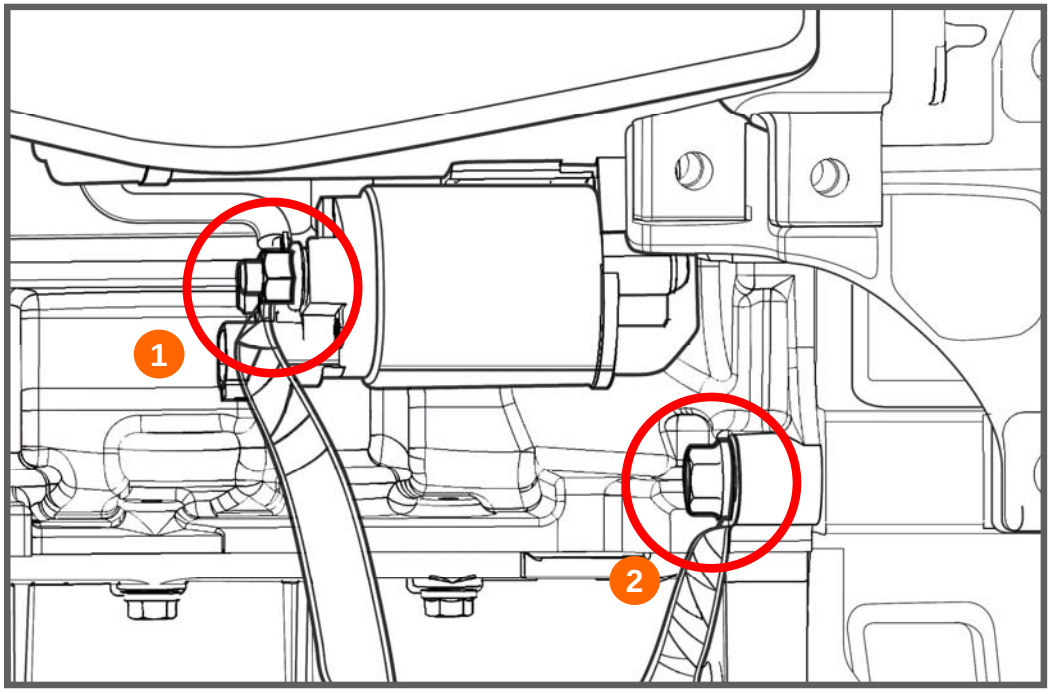
- Remove the oil filter (A) with the oil filter wrench.
- Inspect the threads and O-ring to apply a light coat engine oil onto the new filter. Wipe off the seat.
- Install the new oil filter by hand.
- After the packing seats, tighten the oil filter clockwise with the oil filter wrench. (2.3 ~ 2.5kgf·m / 24.5 Nm)
- Complete the reassembly and start the Engine. Then check for oil leakage.
- Turn off the engine and check the oil level. Add oil if necessary.

WARNING

USED OIL MUST BE STORED IN A SAFE PLACE AWAY FROM CHILDREN AND SOURCES OF IGNITION. IF YOU HAVE A USED OIL DISPOSAL PROBLEM, PLEASE HAVE THE ENGINE OIL CHANGED BY YOUR NEAREST HYUNDAI SEASALL SERVICE DEALER.

BATTERY CABLE CONNECTIONS

- The size of battery cable should be at least 40㎟ within a length of 4m.
- And it should be at least 50㎟ if the cable is longer than 4m.
- Recommended battery capacity is over 150 amperes.
- Connect the battery (+) cable to the starter motor.
- Connect the battery (-) cable to system ground (engine block).
- Battery cables should be clean and tightly connected.



1 STARTER MOTOR , +

2 ENGINE GROUND, -

CAUTION

DO NOT TOUCH OR REMOVE ELECTRICAL PART WHEN STARTING OR DURING OPERATION.
KEEP HAND, HAIR, AND CLOTHES AWAY FROM THE FLYWHEEL AND OTHER ROTATING PARTS WHILE THE ENGINE IS RUNNING.

BATTERY CHECKS

Battery inspection is very important in electronically controlled engines: You must check the battery condition regularly.

LOAD TEST

- Perform the following steps to complete the load test procedure for maintenance-free batteries.

- Connect the load tester clamps to the terminals and proceed with the test as follows:

① If the battery has been charged, remove the surface charge by connecting a 300 ampere load for 15 seconds.

② Connect the voltmeter and apply the specified load.

③ Read the voltage after the load has been applied for 15 seconds.

④ Disconnect the load.

⑤ Compare the voltage reading with the minimum acceptable voltage shown in the table below. If the voltage is greater than shown in the table, the battery is good. If the voltage is less than shown in the table, replace the battery.

Voltage	Temperature
9.6	20˚C (70˚F) and above
9.5	16˚C (60˚F)
9.4	10˚C (50˚F)
9.3	4˚C (40˚F)
9.1	-1˚C (30˚F)
8.9	-7˚C (20˚F)
8.7	-12˚C (10˚F)
8.5	-18˚C (0˚F)

WARNING

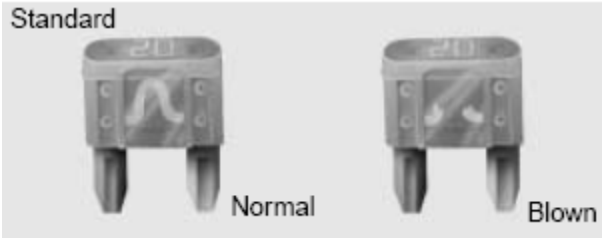
BATTERY MUST BE STORED AND WORKED ON IN A SAFE PLACE AWAY FROM CHILDREN AND SOURCES OF IGNITION.
FLUID IN THE BATTERY IS A CORROSIVE ACID AND MUST BE HANDLED WITH CARE. IF SPILLED ON ANY PART OF BODY, FLUSH IMMEDIATELY WITH WATER.

CAUTION

DO NOT LOOSEN OR DETACH BATTERY TERMINALS WHILE ENGINE IS RUNNING. DOING SO WILL DAMAGE THE CHARGING SYSTEM AND OTHER ELECTRONIC DEVICES.

FUSES

- An engine's electrical system is protected from electrical overload damage by fuses.
- If a fuse has blown, the element inside the fuse will be melted. If the electrical system does not work, first check the fuses in ECU box. Always replace a blown fuse with one of the same rating.
- If the replacement fuse blows, this indicates an electrical problem. Avoid using the system involved and immediately consult an authorized Hyundai SeasAll dealer.



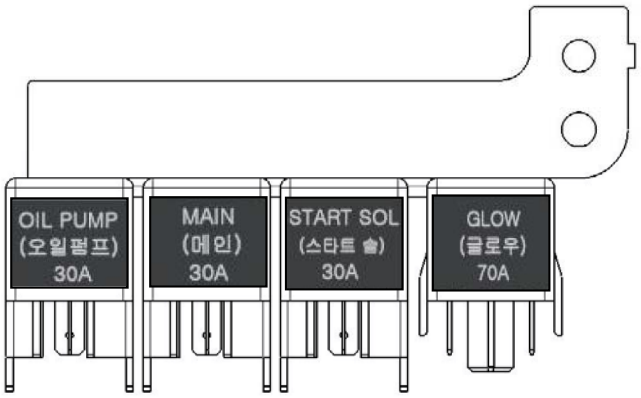
Fuses in the ECU Box

1) System Power : 30Amp
2) Ignition Power : 5Amp
3) ECM(ECU) Power : 20Amp
4) Main Relay Power : 15Amp
5) Spare : 30Amp
6) Fuel Heater Power : 30Amp

RELAYS

Relays in the ECU Box

1) Oil Extraction Pump Relay : 30Amp
2) Main Relay : 30Amp
3) Starter Solenoid Relay : 30Amp
4) Glow Plug Relay : 70Amp

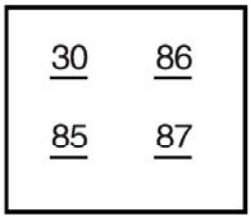


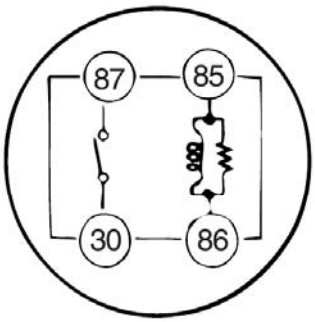
• Using an ohmmeter, check that there is continuity between each terminal.

Terminal	Continuity
30 - 87	NO
85 - 86	YES

• Check for continuity between terminals 30 and 87

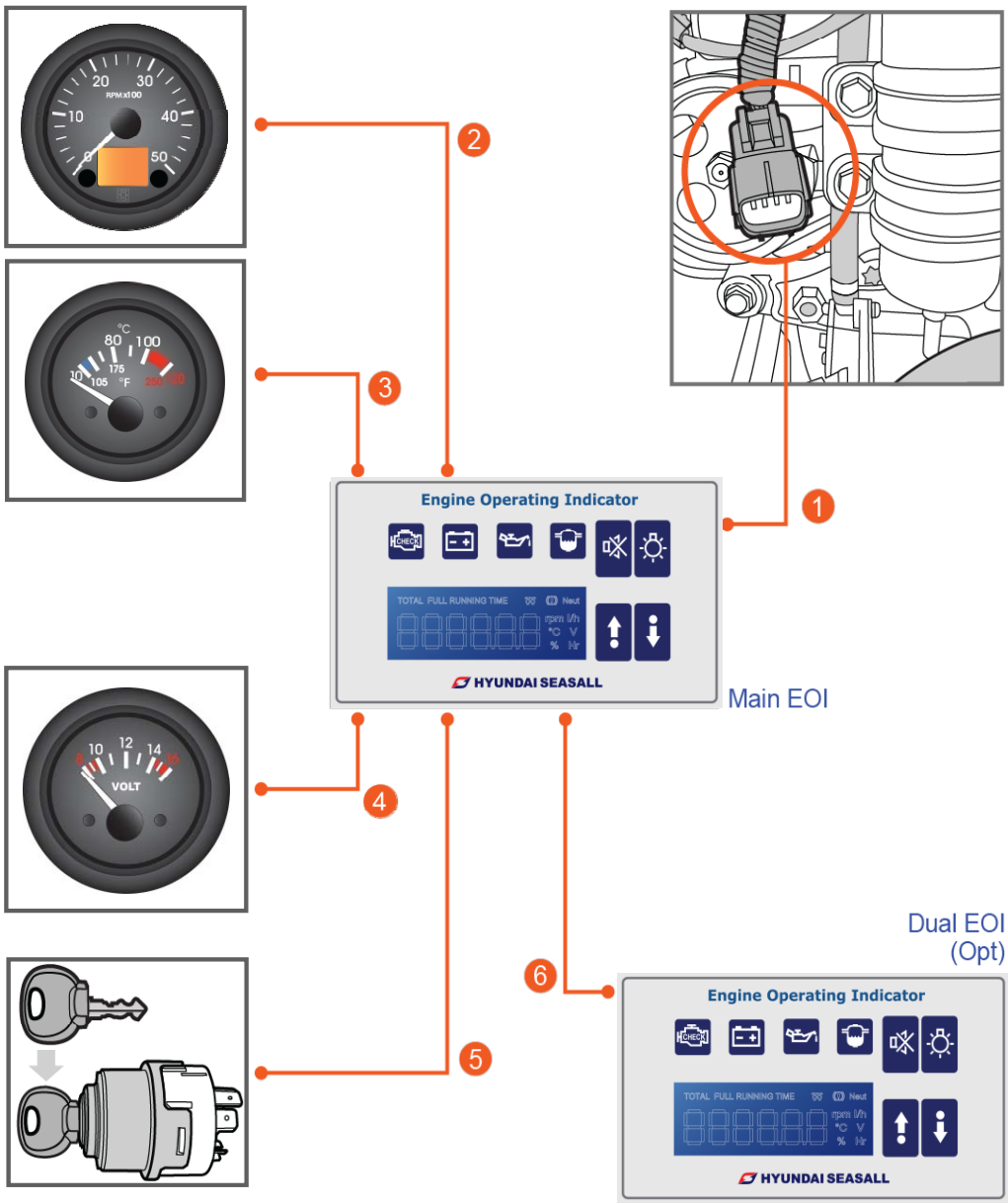
• Always replace a damaged relay with one of the same rating.





CHAPTER 9
INSTRUMENT SYSTEM

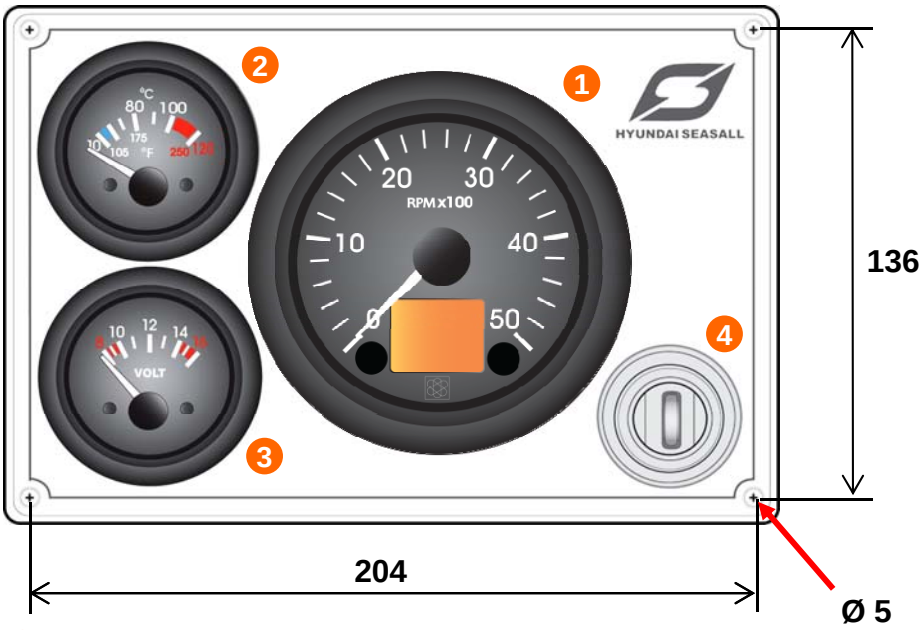
INSTRUMENT CONNECTIONS



1. Engine to EOI wiring (standard: 7m, option: 10m)
2. EOI to RPM gauge(Ø 85) wiring
3. EOI to coolant temp gauge(Ø 52) wiring
4. EOI to volt gauge(Ø 52) wiring
5. EOI to ignition key switch(Ø 21.4) wiring
6. Dual EOI wiring (option for dual stage)

※ For information about the installation and operation of the EOI (Engine Operating Indicator) system, please refer to Chapter 10.

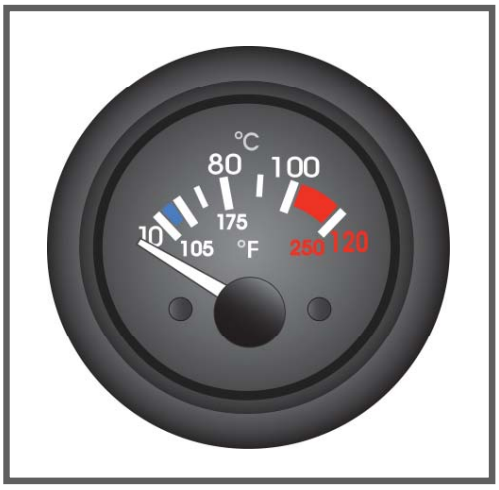
STANDARD INSTRUMENTS



1. RPM Gauge
2. Coolant Temperature Gauge
3. Battery Voltmeter Gauge
4. Ignition Key switch

NOTE: Gauge panel (show above) is not standard but available as an option

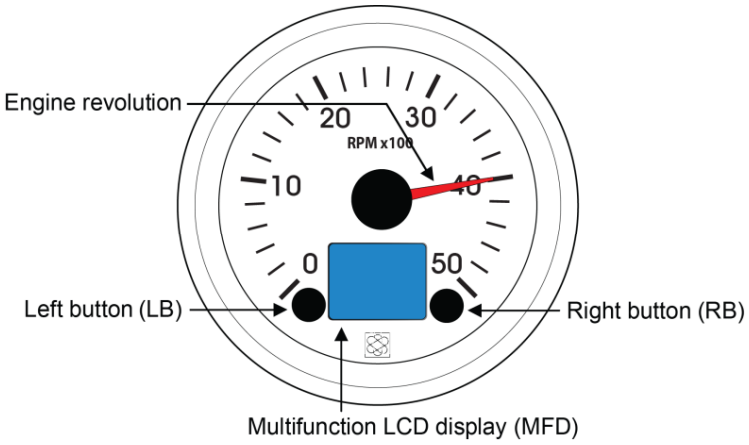
COOLANT TEMPERATURE GAUGE



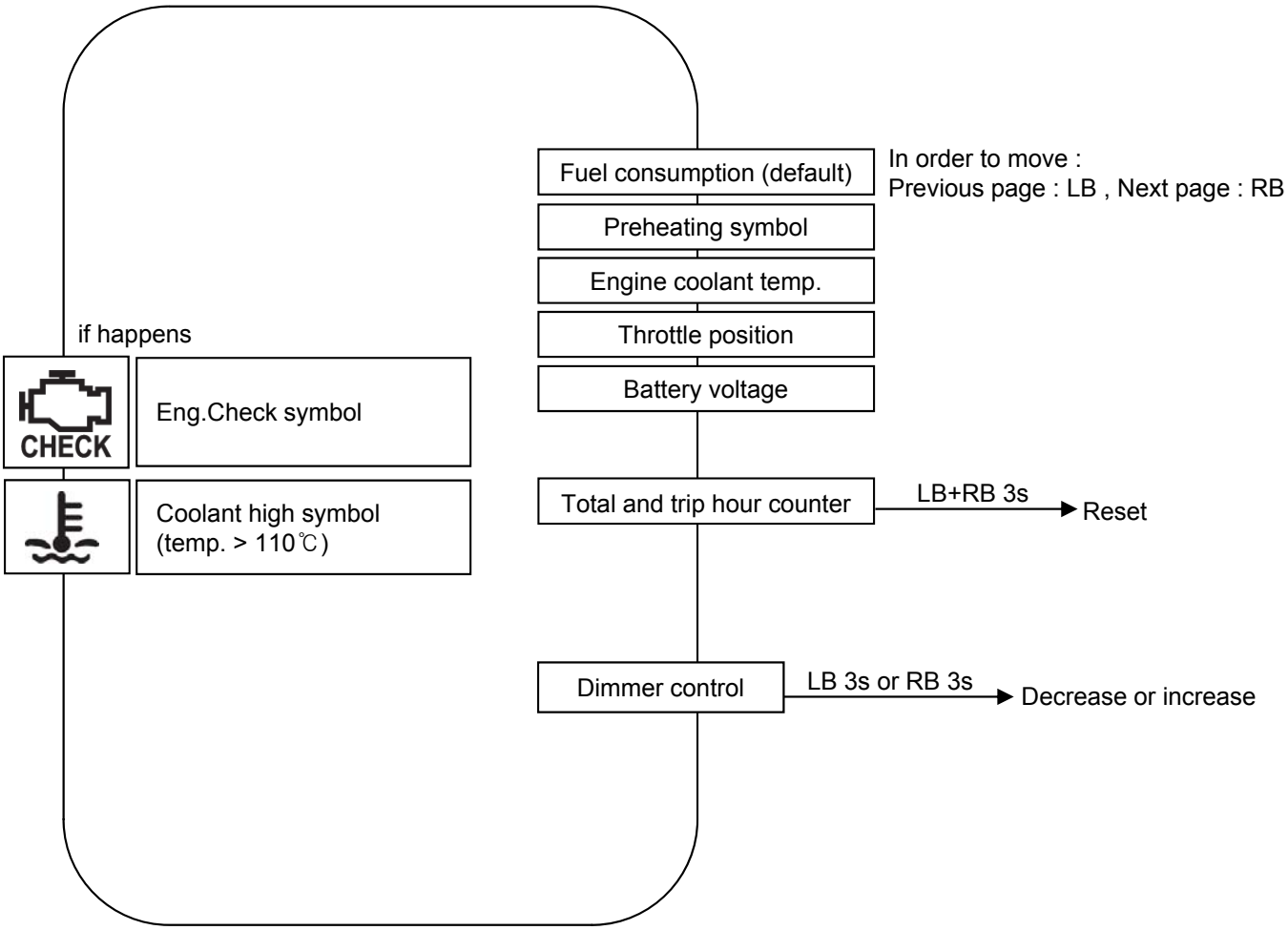
- This gauge will work when the key is in the "ON" position.
- Avoid max. rpm and WOT (Wide Open Throttle) before a cold engine is fully warmed up as it can harm the engine.
- The gauge needle should be in proper range. If the outside temperature is high, the gauge needle may sit at a higher range. As long as the alarm doesn't sound, the engine is normal.
- If the gauge blinks and an EOI alarm sounds, check the coolant temperature and level. If the coolant is low, refill it.
- If the temperature of the engine coolant is higher than 105℃, the engine power will decrease. You should check the engine cooling system.

RPM GAUGE

1) When the key is at ignition ON position, this gauge will work.
2) This gauge indicates real-time engine rpm.
3) Avoid max. rpm and WOT (Wide Open Throttle) before a cold engine is fully warmed up, as it can harm the engine.



USER INTERFACE



BATTERY VOLT METER GAUGE

- This gauge will work when the key is in the “ON” position.
- This gauge indicates real-time battery voltage.
- If battery voltage is not sufficient, the engine can not be started.
- For a working engine, 12～16V volts is normal. If the battery voltage is under 12V, you should check battery and alternator.
- At the moment of engine ignition, the voltmeter needle may momentarily drop to 8V. This is normal.

CUT-OUT FOR GAUGE

- RPM Gauge : Ø 86 mm
- Coolant Temperature Gauge : Ø 53 mm
- Battery Volt Meter Gauge : Ø 53 mm
- Ignition Key : Ø 27 mm

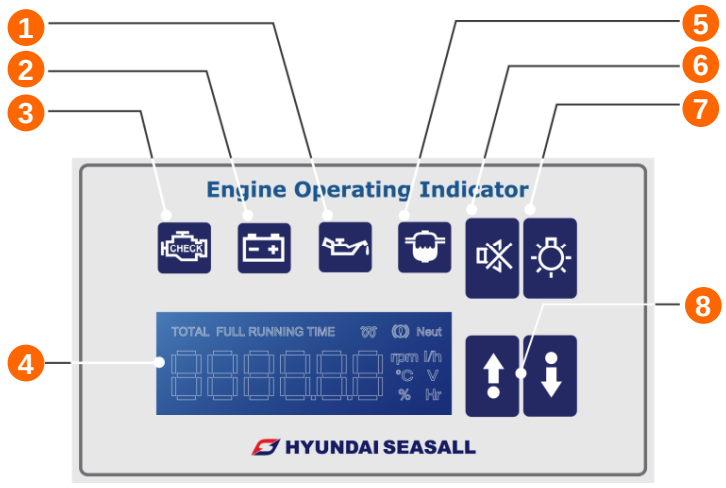
CUT-OUT FOR EOI SYSTEM

- You can use the installation template enclosed with EOI for a cut-out.

CHAPTER 10
EOI SYSTEM

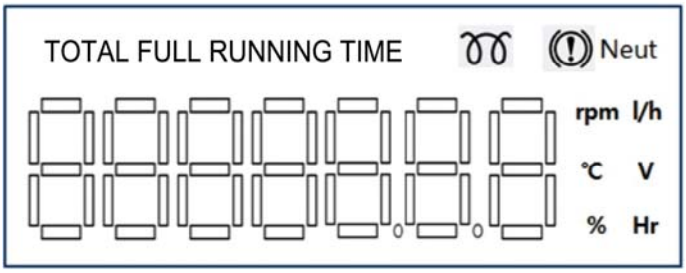
The Engine Operating Indicator (EOI) system gives you a lot of information about the engine's current status. You can hear alarm beeps, or see information including RPM, coolant temperature, warning lamps, error codes and engine working time. If the switch is on, warning lamps for battery, engine oil and so on will flash. When the engine starts normally, the lamps all go off. If there is a problem, the specific lamp will come on. You should contact your nearest dealer and have the engine checked as soon as possible.

OVERVIEW OF EOI SYSTEM



1. Engine Oil pressure Warning Lamp
2. Alternator Charging Warning Lamp
3. Engine Check Lamp
4. Information LCD
5. Water detection Warning Lamp
6. Buzzer Reset Switch
7. Dimmer Switch
8. Function Switch

INFORMATION LCD



1) Engine rpm (RPM)
2) Engine Coolant Temp. (℃)
3) Throttle Lever Position (%)
4) Fuel Consumption (ℓ/h)
5) Battery Voltage (V)
6) Running Time (Hr)
7) Total WOT Running Time (Hr)
8) Glow Plug Indicator lamp
9) Neutral Lever Alarm lamp Neut
10) DTC (Diagnosis Trouble Code)

SWITCHES

- Buzzer Reset Switch - This switch is used for turning off the alarm temporarily.
- Dimmer Switch - This switch is used for controlling brightness of the other gauges connected to the EOI.
- Function Switch - This switch is used for changing the information display on the LCD.

ALARM LAMPS

Alarm may sound when alarm lamps flicker.

WATER SENSOR LAMP

- This lamp informs you to extract water from fuel filter.
- If the lamp is on, you should stop the engine immediately and drain the water in the fuel filter.
- It is recommended to check and drain the water in the fuel filter at regular periods before the lamp turns on.
- It can be harmful to drive your engine with this lamp on.

ENGINE OIL LAMP

- This lamp informs you of the engine oil pressure low.
- If this lamp is on, you should stop the engine and check the oil level with oil gauge. If the oil is low, refill it. If you refill the oil and the lamp still does not turn off, you should ask your local service shop for maintenance.

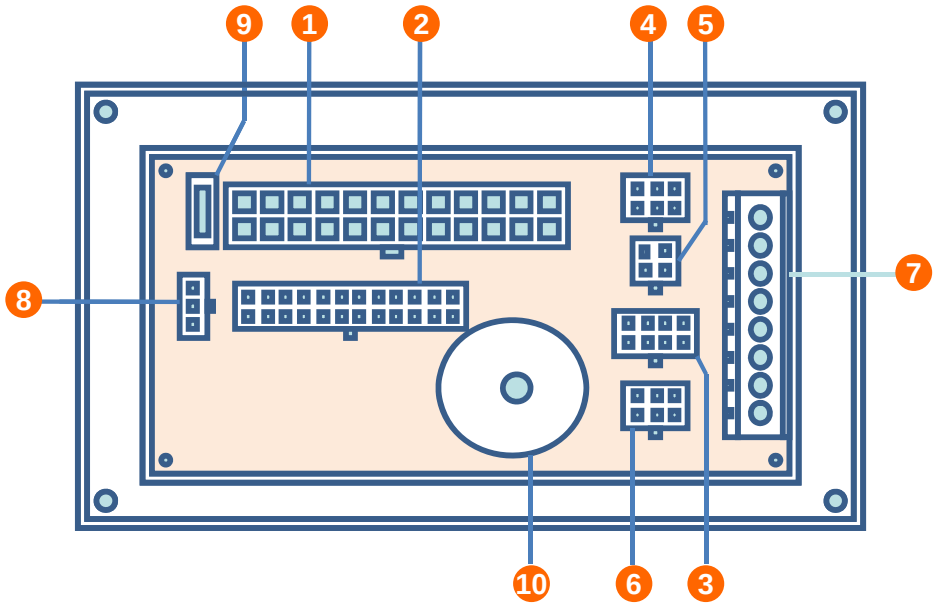
ALTERNATOR LAMP

- This lamp informs you to recharge your battery.
- If this lamp is turned on, you should stop the engine and eliminate electric load, as well as check the alternator, alternator drive belt and wiring system.

CHECK ENGINE LAMP

- This lamp informs you that the engine has a serious problem.
- You can see the DTC on the LCD of the EOI .
- It may be possible to drive at limited rpm. The ECU will control the functions to protect the engine. You should immediately have the engine checked at the nearest service shop.

EOI CONNECTIONS



Rear view

1. Connection plug – CN1 (from engine)
2. Connection plug – CN2 (to dual EOI)
3. Connection plug – CN3 (tachometer)
4. Connection plug – CN4 (coolant temp. gauge)
5. Connection plug – CN5 (volt gauge)
6. Connection plug – CN6 (service tool)
7. Connection plug – CN7 (external)
8. Connection plug – CN8 (key box)
9. System power fuse (3 amp)
10. Buzzer

WARNING

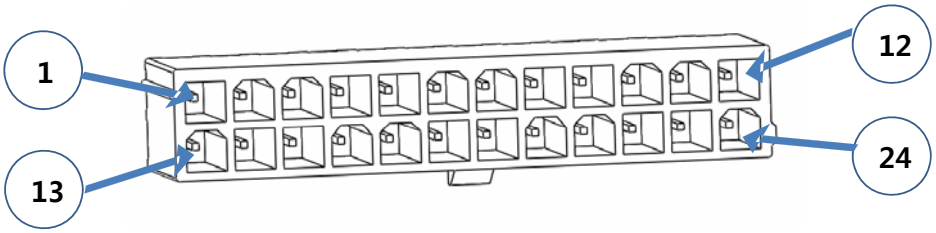
LISTEN FOR A CLICK WHEN FASTENING CONNECTORS. THIS SOUND INDICATES THAT THEY ARE SECURELY LOCKED

CAUTION

DON'T CONNECT EXTRA INSTRUMENTS WHICH DRAW MORE THAN 1 AMPERE. THE E.O.I WILL BE OVERLOADED AND DAMAGED

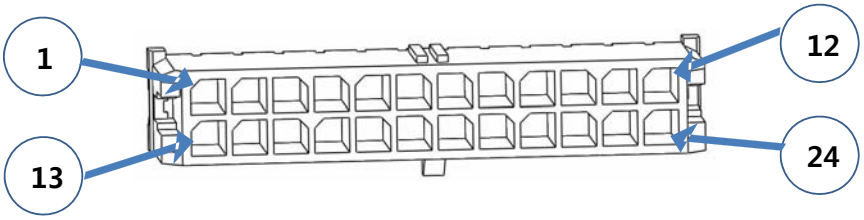
EOI PIN ASSIGNMENT

CN1 (MAIN EOI CONNECTOR FROM ENGINE)



1. Ignition power
2. Main relay power
3. Permanent power
4. Not used
5. Not used
6. Coolant temperature signal
7. Not used
8. Check lamp
9. Oil pressure signal
10. Ground
11. Not used
12. Water detection signal
13. RPM signal
14. Spare
15. Spare
16. Spare
17. Neutral signal
18. K line
19. CAN_L
20. Charging signal
21. CAN_H
22. Not used
23. Ground
24. Not used

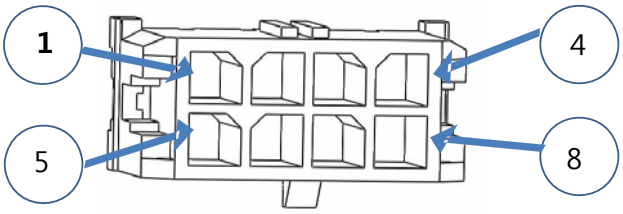
CN2 (DUAL EOI CONNECTOR)



1. Ignition power
2. Main relay power
3. Permanent power
4. Not used
5. Not used
6. Not used
7. Not used
8. Check lamp
9. Oil pressure signal
10. Ground
11. Not used
12. Water detection signal
13. RPM signal
14. Spare
15. Spare
16. Spare
17. Neutral signal
18. K line
19. CAN_L
20. Charging signal
21. CAN_H
22. Not used
23. Ground
24. Not used

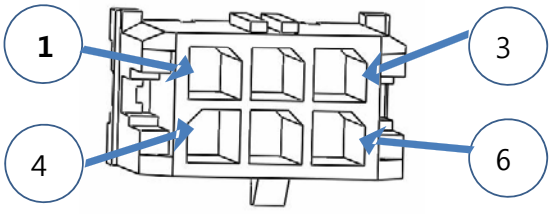
CN3 (TACHOMETER)

1. Main relay power
2. RPM signal
3. Ground
4. Illumination
5. Illumination
6. CAN_H
7. CAN_L
8. Not used



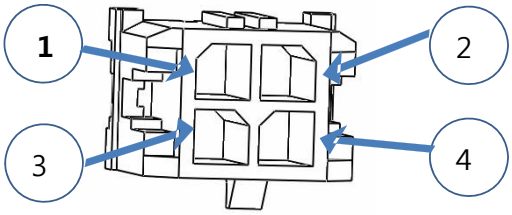
CN4 (COOLANT TEMP. GAUGE)

1. Coolant temperature signal
2. Ignition power
3. Ground
4. Illumination
5. Illumination
6. Not used



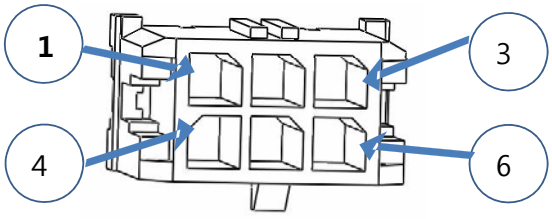
CN5 (VOLT GAUGE)

1. Ignition power
2. Ground
3. Illumination
4. Illumination



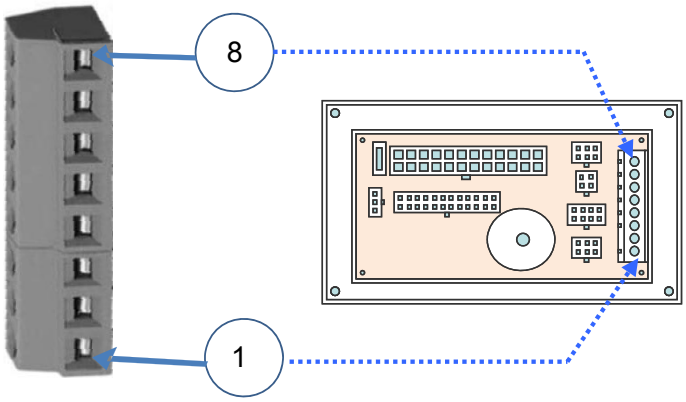
CN6 (SERVICE TOOL)

1. CAN_H
2. CAN_L
3. K_line
4. Ground
5. Main relay power
6. Not used



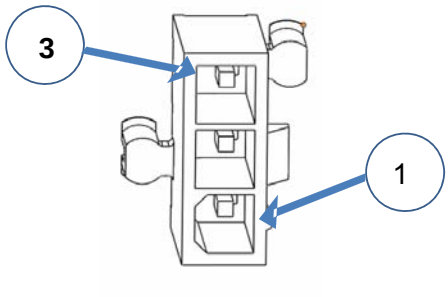
CN7 (EXTERNAL)

1. Ground
2. Permanent power
3. Ignition power
4. Neutral switch
5. Neutral switch
6. Charging signal
7. RPM signal
8. Dimmer



CN8 (KEY BOX)

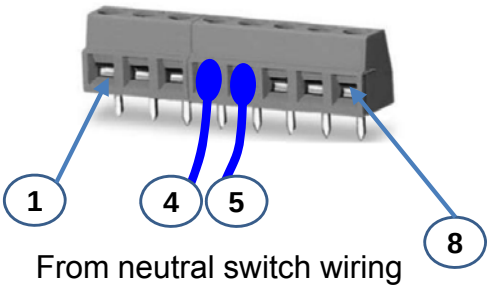
1. Ignition power
2. Starter power
3. Permanent power



NEUTRAL SWITCH AND DUAL EOI CONNECTION

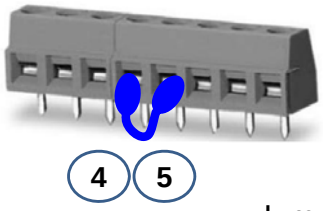
1) Neutral switch wires should be connected at pin #4 and #5 of the external connector of the EOI. If there is no neutral switch, jumper #4 and #5 with a short jumper wire.

SYSTEM WITH A NEUTRAL SWITCH



From neutral switch wiring

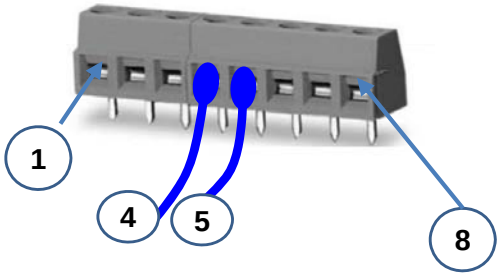
SYSTEM WITH NO NEUTRAL SWITCH



Jumper

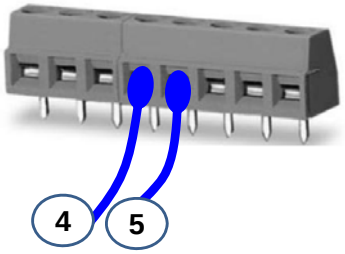
2) If there is a dual EOI, you should connect the wiring between #5 (external connector of the main EOI) and #5 (external connector of the dual EOI)

Main EOI external connector



From neutral switch wiring

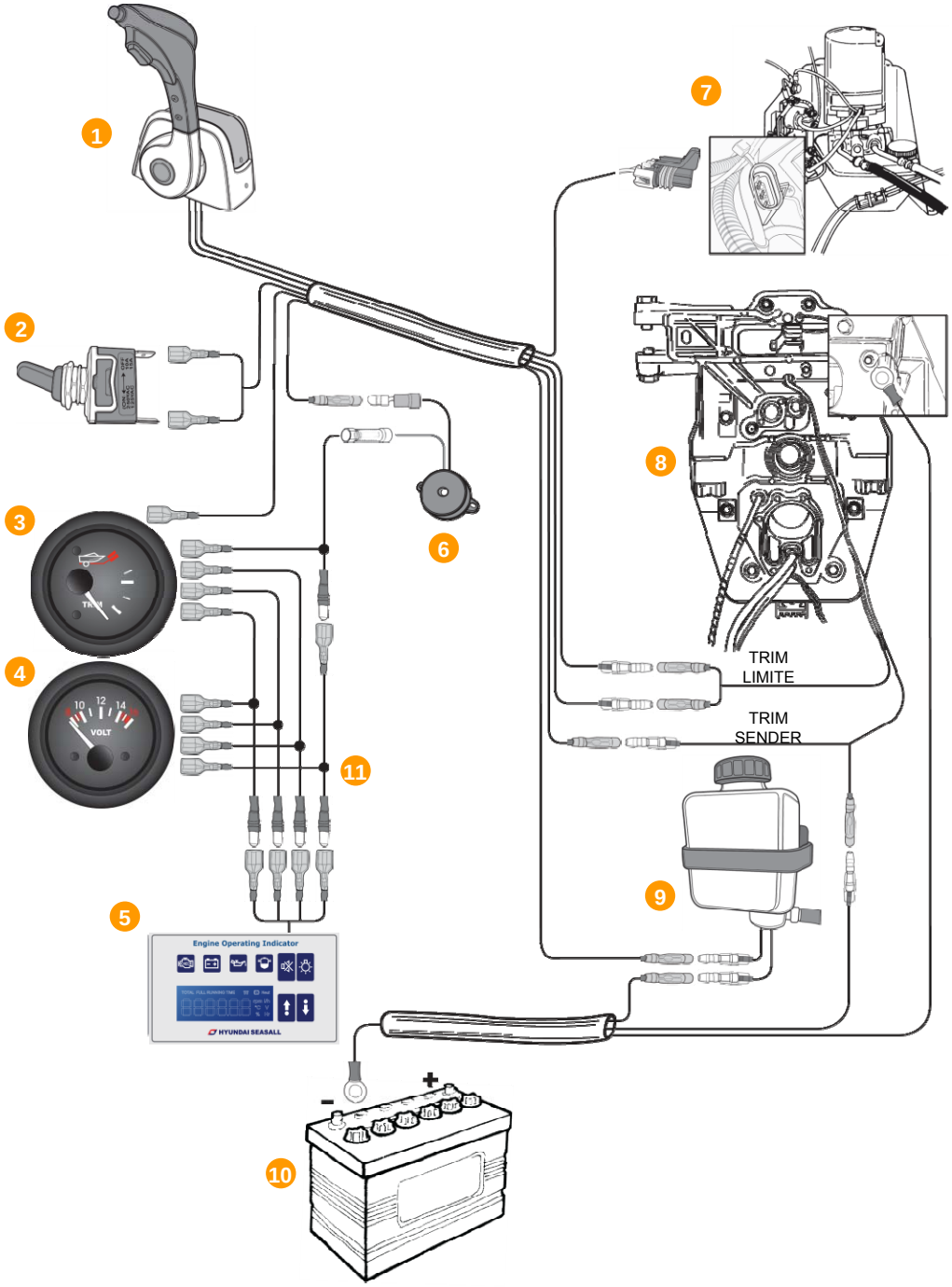
Dual EOI external connector



CAUTION

FOR USER'S SAFETY, ENGINE WILL NOT CRANK OR START IF GEAR POSITION LEVER IS NOT IN NEUTRAL OR NOT CONNECTED TO THE EOI EXTERNAL CONNECTION.

TRIM WIRING CONNECTION DIAGRAM (STERNDRIVES ONLY)



1. REMOTE CONTROL
2. TRAILER SWITCH (SIDE TYPE ONLY)
3. GAUGE-TRIM
4. GAUGE-VOLT
5. E O I
6. BUZZER (DRIVE OIL)
7. TRIM PUMP
8. TRANSOM PLATE
9. GEAR LUBE MONITOR
10. BATTERY
11. GAUGE & LAMP POWER

ALARM LIST AND DTC(DIAGNOSIS TROUBLE CODE)

If there is a problem with the engine, the EOI display (audible or visible) alarm and related DTC (diagnosis trouble code) will give you information about it. The DTC display is only for initial assistance and to aid communication with a Hyundai SeasAll dealer if there is an emergency. You should contact your nearest Hyundai SeasAll dealer as soon as possible if a system problem arises.

Item	DTC	Description	Fail safety		Alarm		Possible Cause(s)
			Fuel cut off	Note 1) RPM limit	Lamp	Buzzer	
VGT variable geometry turbocharger	P2263	EVGT controller overheat, learning error, feedback line error	-		CHECK	√	• Overload, VGT cooling circuit • VGT actuator adaption error • VGT actuator performance error
	P2563	PWM failure					
	P0048	Short circuit battery	-	○	CHECK	√	• VGT actuator circuit • VGT actuator
	P0047	Short circuit ground					
		No Load					
	P0234	Boost pressure higher than target value	-		CHECK	√	• VGT actuator performance error
	P0299	Boost pressure lower than target value					• Air leakage check • Intercooler • VGT actuator performance error
APS1 acceleration position sensor1	P2138	Plausibility With Aps2 Violated	-	1250 rpm fixed	CHECK	√	• APS1/2 sensor circuit • APS sensor • ECM (engine control module)
	P2127	Voltage Above Lower Limit					
	P2123	Voltage Above Upper Limit					
	P0643	Supply Voltage Above Upper Limit					
	P0642	Supply Voltage Below Lower Limit					
APS2 acceleration position sensor2	P2128	Voltage above upper limit					
	P0653	Supply voltage above upper limit					
	P0652	Supply voltage below lower limit					
CMPS cam position sensor	P0340	No camshaft signal	√ (at starting)	●	CHECK	√	• CMPS circuit • CMPS
	P0341	Wrong camshaft signal					
CKPS crank position sensor	P0335	No crankshaft signal (engine running)	√	-	CHECK	√	• CKPS circuit • CKPS • Target wheel check
	P0336	Wrong crankshaft signal (restart)					
Water detection in fuel	P2264	Water in fuel is detected	-	●		√	• Water in fuel, fuel filter (drain out water and check the fuel in fuel tank) • Warning lamp circuit • Water detection sensor error
Cylinder1 injector	P0201	Open load		○	CHECK	√	• Injector circuit • Injector
	P0261	Short circuit ground	√	-			
	P0262	Short circuit battery					
	P0263	Defect resistance cylinder1, Charging/discharging energy error	-				
Cylinder2 injector	P0202	Open load		○	CHECK	√	• Injector circuit • Injector
	P0264	Short circuit ground	√	-			
	P0265	Short circuit battery					
	P0266	Defect resistance cylinder1, Charging/discharging energy error	-				

Item	DTC	Description	Fail safety		Alarm		Possible Cause(s)
			Fuel cut off	Note 1) RPM limit	Lamp	Buzzer	
Cylinder3 injector	P0203	Open load		○	CHECK	√	• Injector circuit • Injector
	P0267	Short circuit ground	√	-			
	P0268	Short circuit battery					
	P0269	Defect resistance cylinder1, Charging/discharging energy error	-				
Cylinder4 injector	P0204	Open load		○	CHECK	√	• Injector circuit • Injector
	P0270	Short circuit ground	√	-			
	P0271	Short circuit battery					
	P0272	Defect resistance cylinder1, Charging/discharging energy error	-				
Note 2) Cylinder5 injector	P0205	Open load		○	CHECK	√	• Injector circuit • Injector
	P0273	Short circuit ground	√	-			
	P0274	Short circuit battery					
	P0275	Defect resistance cylinder1, Charging/discharging energy error	-				
Note 3) Cylinder6 injector	P0206	Open load		○	CHECK	√	• Injector circuit • Injector
	P0276	Short circuit ground	√	-			
	P0277	Short circuit battery					
	P0278	Defect resistance cylinder1, Charging/discharging energy error	-				
Injector Bank Error	P062D	Bank 1 error	√	-	CHECK	√	• Charging system (battery, alternator check) • ECM
	P062E	Bank 2 error					
Injectors Circuit	P0611	Error path for short circuit of charging switch is detected	√	-	CHECK	√	• Injectors circuit • ECM
	P0200	Injector circuit error					
RPS rail pressure sensor	P0193	Voltage above upper limit	-	●	CHECK	√	• PRS circuit • PRS • APS 2 power supply circuit • BPS power supply circuit • ECM
	P0192	Voltage below lower limit					
	P0653	Supply voltage above upper limit					
	P0652	Supply voltage below lower limit					
Rail pressure Monitoring	P0087	Maximum positive deviation of rail pressure exceeded	-	○	CHECK	√	• Fuel filter • RPS check • P-PRV , PRV check(stuck)
	P0088	Maximum negative deviation of rail pressure exceeded					
	P1171	Minimum rail pressure exceeded	√	-			
	P1172	Maximum rail pressure exceeded	-	○			
BPS boost pressure sensor	P0238	Voltage above upper limit	-	●	CHECK	√	• BPS circuit • BPS • RPS power supply circuit • APS 2 power supply circuit • ECM
	P0237	Voltage below lower limit					
	P0069	Not plausible with atmospheric pressure sensor		-	-	-	
	P0653	Supply voltage above upper limit		●	CHECK	√	
	P0652	Supply voltage below lower limit					

Item	DTC	Description	Fail safety		Alarm		Possible Cause(s)
			Fuel cut off	Note 1) RPM limit	Lamp	Buzzer	
PPRV pump pressure regulator valve	P0254	Short circuit to battery of metering unit output	-	○		√	• P-PRV circuit • P-PRV
	P0253	Short circuit to ground of metering unit output	√	-			
		Open load of metering unit output	-	○			
	P0252	Powerstage error					
PRV (rail) pressure regulator valve	P0092	Short circuit to battery of pressure control valve output	√	-		√	• PRV circuit • PRV
	P0091	Short circuit to ground of pressure control valve output					
		Open load of pressure control valve output					
	P0089	Powerstage error					
OPS oil pressure sensor	-	Oil pressure low (below 0.8 bar)	-	-		√	• Oil switch, Oil level, Circuit check
Charging Error	-	Charging system error	-	-		√	• Alternator, Charging circuit check
E(C)TS engine coolant temp. sensor	-	Coolant temperature high (above 110℃)	-	Depending temp.	EOI LCD Blinking	√	• ECTS circuit • ECTS • Cooling line check

Note 1) RPM Limit : ● (Rated rpm - 500rpm), ○ (Rated rpm - 800rpm)

Note 2),3) would be applied to S250/220 models

FULL DTC(DIAGNOSIS TROUBLE CODE) LIST

NO	P code	DESCRIPTION
1	P0016	Crankshaft Position – Camshaft Position Correlation
2	P0047	Turbocharger Boost Control Solenoid Circuit Low
3	P0048	Turbocharger Boost Control Solenoid Circuit High
4	P0069	Manifold Absolute Pressure – Barometric Pressure Correlation
5	P0087	Fuel Rail/System Pressure - Too Low
6	P0088	Fuel Rail/System Pressure - Too High
7	P0089	Fuel Pressure Regulator 1 Performance
8	P0091	Fuel Pressure Regulator 1 Control Circuit Low
9	P0092	Fuel Pressure Regulator 1 Control Circuit High
10	P0097	Intake Air Temperature Sensor 2 Circuit Low
11	P0098	Intake Air Temperature Sensor 2 Circuit High
12	P0107	Atmospheric Pressure Sensor Voltage Lower Limit
13	P0108	Atmospheric Pressure Sensor Voltage Upper Limit
14	P0112	Intake Air Temperature Sensor1 Circuit Low Input
15	P0113	Intake Air Temperature Sensor1 Circuit High Input
16	P0116	Engine Coolant Temperature Circuit Range / Performance
17	P0117	Engine Coolant Temperature Circuit Low Input
18	P0118	Engine Coolant Temperature Circuit High Input
19	P0182	Fuel Temp Sensor A Circuit Low Input
20	P0183	Fuel Temp Sensor A Circuit High Input
21	P0192	Fuel Rail Pressure Sensor Circuit Low input
22	P0193	Fuel Rail Pressure Sensor Circuit High Input
23	P0194	Fuel Rail Pressure Sensor Circuit Intermittent
24	P0201	Cylinder 1 Injector Open Load
25	P0202	Cylinder 2 Injector Open Load
26	P0203	Cylinder 3 Injector Open Load
27	P0204	Cylinder 4 Injector Open Load
28	P0205	Cylinder 5 Injector Open Load
29	P0206	Cylinder 6 Injector Open Load
30	P0231	Fuel Pump Secondary Circuit Low

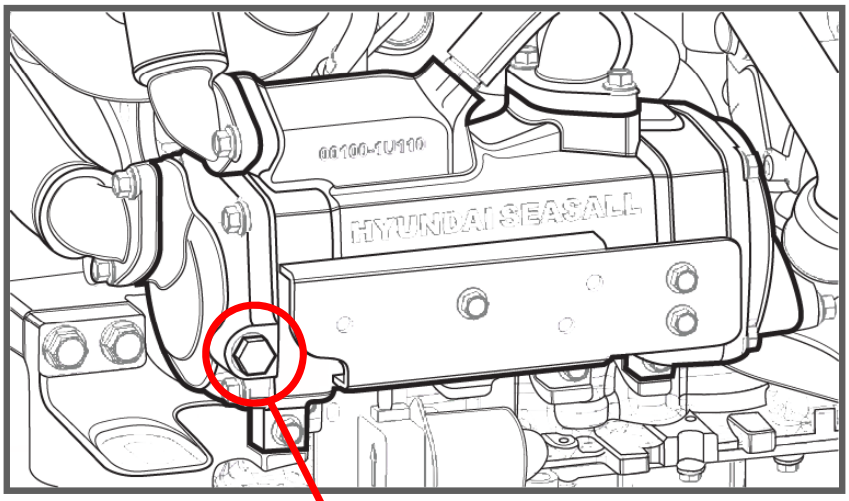
NO	P code	DESCRIPTION
31	P0232	Fuel Pump Secondary Circuit High
32	P0234	Turbocharger Over boost Condition
33	P0237	Turbocharger Boost Sensor "A" Circuit Low
34	P0238	Turbocharger Boost Sensor "A" Circuit High
35	P0252	Injection Pump Fuel Metering Control "A" Range/Performance
36	P0253	Injection Pump Fuel Metering Control "A" Low (Cam/Rotor/Injector)
37	P0254	Injection Pump Fuel Metering Control "A" High (Cam/Rotor/Injector)
38	P0261	Cylinder 1 - Injector Circuit Low
39	P0262	Cylinder 1 - Injector Circuit High
40	P0263	Cylinder 1 Contribution/Balance
41	P0264	Cylinder 2 - Injector Circuit Low
42	P0265	Cylinder 2 - Injector Circuit High
43	P0266	Cylinder 2 Contribution/Balance
44	P0267	Cylinder 3 - Injector Circuit Low
45	P0268	Cylinder 3 - Injector Circuit High
46	P0269	Cylinder 3 Contribution/Balance
47	P0270	Cylinder 4 - Injector Circuit Low
48	P0271	Cylinder 4 - Injector Circuit High
49	P0272	Cylinder 4 Contribution/Balance
50	P0273	Cylinder 5 - Injector Circuit Low
51	P0274	Cylinder 5 - Injector Circuit High
52	P0275	Cylinder 5 Contribution/Balance
53	P0276	Cylinder 6 - Injector Circuit Low
54	P0277	Cylinder 6 - Injector Circuit High
55	P0278	Cylinder 6 Contribution/Balance
56	P0299	Turbocharger Under boost
57	P0300	Random/Multiple Cylinder Misfire Detected
58	P0335	Crankshaft Position Sensor A Circuit
59	P0336	Crankshaft Position Sensor A Circuit Range/Performance
60	P0340	Camshaft Position Sensor A Circuit Malfunction

NO	P code	DESCRIPTION
61	P0341	Camshaft Position Sensor A Circuit Range/Performance
62	P0381	Glow Plug/Heater Indicator Circuit
63	P0562	System Voltage Low
64	P0563	System Voltage High
65	P0601	Internal Control Module Memory Check Sum Error
66	P0602	Control Module Programming Error
67	P0604	Internal Control Module Random Access Memory (RAM) Error
68	P0605	Internal Control Module Read Only Memory(ROM) Error
69	P0606	ECM/PCM Processor
70	P0611	Injector Circuit Error
71	P0617	Starter Relay Circuit High
72	P062D	Injector Bank1 Error
73	P062E	Injector Bank2 Error
74	P0650	Malfunction Indicator Lamp(MIL) Control Circuit
75	P0670	Glow Plug Module Control Circuit
76	P0671	Cylinder 1 Glow Plug Circuit
77	P0672	Cylinder 2 Glow Plug Circuit
78	P0673	Cylinder 3 Glow Plug Circuit
79	P0674	Cylinder 4 Glow Plug Circuit
80	P0675	Cylinder 5 Glow Plug Circuit
81	P0676	Cylinder 6 Glow Plug Circuit
82	P0683	Glow Control Module Signal
83	P0684	Glow Control Module Performance
84	P0685	ECM/PCM Power Relay Control Circuit /Open
85	P0642	Sensor Reference Voltage “A” Circuit Low
86	P0643	Sensor Reference Voltage “A” Circuit High
87	P0652	Sensor Reference Voltage “B” Circuit Low
88	P0653	Sensor Reference Voltage “B” Circuit High
89	P0698	Sensor Reference Voltage “C” Circuit Low
90	P0699	Sensor Reference Voltage “C” Circuit High
91	P1145	Overrun Monitoring

NO	P code	DESCRIPTION
92	P1171	Minimum Rail Pressure Exceeded
93	P1172	Maximum Rail Pressure Exceeded
94	P1173	Set Value of PCV not in Plausibility Range
95	P1185	Maximum Pressure Exceeded
96	P1186	Minimum Pressure at Engine Speed Too Low
97	P1187	Regulator Valve Stick
98	P1188	Leakage
99	P12BF	ECU torque monitoring - Not plausible signal
100	P1302	ECU torque monitoring - ADC error
101	P1307	Acceleration Sensor Range/Performance
102	P1308	Acceleration Sensor Circuit Low Input
103	P1309	Acceleration Sensor Circuit High Input
104	P1325	Glow Relay Malfunction
105	P1636	Voltage Regulator for Injector
106	P1652	Ignition Key No Signal
107	P1653	After-Run Check Error
108	P1655	Tachometer Output Fault
109	P1670	Invalid Injector IQA/C2I
110	P1671	Injector IQA Checksum Error
111	P1679	EMS Data Fail (Data frame, CS, Message error)
112	P1694	EMS Message Error
113	P1695	EMS Memory Error
114	P1697	HI-SCAN message Error
115	P2009	Variable Swirl Actuator Control Circuit Low(Bank 1)
116	P2010	Variable Swirl Actuator Control Circuit High(Bank 1)
117	P2015	Variable Swirl Actuator Position Sensor/Switch Circuit Range/Performance
118	P2016	Variable Swirl Actuator Position Sensor/Switch Circuit Low
119	P2017	Variable Swirl Actuator Position Sensor/Switch Circuit High
120	P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input
121	P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input
122	P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input
123	P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input

NO	P code	DESCRIPTION
124	P2138	Throttle/Pedal Position Sensor/Switch “D” / “E” Voltage Correlation
125	P2299	Brake Pedal Position / Accelerator Pedal Position Incompatible
126	P2228	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
127	P2229	Manifold Absolute Pressure/Barometric Pressure Circuit High Input
128	P2262	Turbocharger Boost Pressure Not Detected - Mechanical
129	P2263	Turbocharger Boost System Performance
130	P2264	Water in Fuel Sensor Circuit
131	P2562	Turbocharger Boost Control Position Sensor "A" Circuit
132	P2563	Turbocharger Boost Control Position Sensor "A" Circuit Range/Performance
133	P2564	Turbocharger Boost Control Position Sensor "A" Circuit Low
134	P2565	Turbocharger Boost Control Position Sensor "A" Circuit High
135	P2566	Turbocharger Boost Control Position Sensor "A" Circuit Intermittent
136	U0001	High Speed CAN Communication Bus
137	U0100	Faults in CAN a Transmit Messages

CHAPTER 11
ANTI CORROSION SYSTEM



Heat exchanger

Sacrificial anodes

A sacrificial anode must be replaced when more than 60% of it has been used. Check especially frequently when used in saltwater. It is recommended to replace the sacrificial anodes at the start of each season.

CAUTION

•DON'T OPERATE ENGINE WITHOUT ANODES. IT IS HARMFUL TO YOUR ENGINE.
•CLOSE THE SEAWATER VALVE BEFORE THIS MAINTENANCE.
• MAKE SURE TO CHECK THE ANODE PLUG IN ACCORDANCE WITH THIS MANUAL: DON'T LOOSEN COOLANT DRAIN PLUG.

CHAPTER 12
ENGINE STORAGE

The major consideration in preparing your engine for storage is to protect it from rust, corrosion, and damage caused by freezing of trapped water.
The following storage procedures should be followed to prepare your engine for out-of-season storage or prolonged storage (two months or longer and/or winter storage) :

CHECK LIST
• Visual inspection for leaks and damage
• Change engine oil and oil filter
• Replace fuel filter
• Check air filter element and clean if necessary
• Check engine coolant level and top up if necessary
• Check impeller and replace if necessary
• Check anodes and replace if necessary
• Clean the engine
• Flush and drain seawater cooling system
• Fill fuel tank until full and inspect the fuel system
• Remove the battery and store in a cool, dry place

CAUTION

FOR WINTER STORAGE, SEAWATER SHOULD BE DRAINED FULLY BY LOOSENING THE HEAT EXCHANGER ANODE.
REFER TO CHAPTER 10.

PREDELIVERY INSPECTION CHECK LIST

BEFORE THE WATER TEST

	Y	N
Seawater inlet valve open		
Engine coolant level		
Cooling system hose clamps tight		
Engine oil level		
Power steering fluid level		
Drive belt tension		
All electrical connections tight		
EOI warning system operating		
Battery fully charged and secured		
All fuel connections tight		
Exhaust system hose clamps tight		
Engine mount tight		
Engine alignment		
Correct rotation propeller (Installed and correct torque)		
Engine coolant and oil drain plug closed		
Throttle, shift and steering system fasteners tightened properly		

-PROPULSION CHECKS

Stern drive unit oil level		
Power trim oil level (stern drives)		
Drive unit fasteners torque		
Power trim cylinders fasteners tight		
Propeller nut torque		
Transmission fluid level		

ON THE WATER TEST

	Y	N
Boat drain plug in place (check before putting boat in water)		
Seawater pump operation		
Seawater strainer correctly mounted , Clean and tightly closed		
Engine alignment (propulsion only)		
Fuel leaks		
Oil leaks		
Coolant leaks		
Water leaks		
Exhaust leaks		
EOI and gauges operation		
Engine emergency stop switch operation		
Idle RPM, within specifications		
WOT RPM, within specifications (in forward gear)		

-PROPULSION CHECKS

Steering operation throughout range		
Power trim operation (stern drives)		
Shift operation		
Drive oil leaks		

1.3 AFTER THE WATER TEST

Fuel, oil, coolant, water and fluid leaks		
Oil and fluid level		
Propeller nut torque		

MAINTENANCE SCHEDULE

Maintenance item / Maintenance intervals		Whichever comes first		
		Daily	200h / 1year	400h / 2years
Cooling system	Check the coolant level and for leaks	●		
	Replace the seawater pump impeller		●	
	Inspect the thermostat		●	
	Clean the heat exchanger tube bundle			●
	Check and clean the seawater strainer	●		
Exhaust system	Check for leaks	●		
	Replace the exhaust rubber bellows			●
Fuel system	Check for leaks	●		
	Replace the fuel filter		●	
	Replace the secondary fuel filter		●	
Air intake system	Clean the air filter		●	
	Clean the inter-cooler tube bundle			●
Lubrication system	Check the level and for leaks	●		
	Change the engine oil and filter		●	
Electrical systems	Check the tight connections / contamination		●	
Anti corrosion system	Check the sacrificial anodes[1)]		●	
Driving belt	Check the belt condition		●	
Battery	Check the operating voltage	●		
Check tightness of the bolts, nuts and other fasteners			●	
Check tightness and for corrosion of hose clamps		●		
Steering system	Check the oil level and for leaks	●		
Propulsion system[2)]	Check the level and for leaks	●		

1) If corroded over 60%, replace.
2) For more detailed maintenance, follow manufacturer's specifications.

CAUTION

YOU SHOULD EXERCISE THE UTMOST CARE TO PREVENT INJURY TO YOURSELF OR ENGINE DAMAGE WHENEVER PERFORMING ANY MAINTENANCE OPERATIONS.

STERNDRIVE & TRANSMISSION MAINTENANCE SCHEDULE

Maintenance item / Maintenance intervals	Whichever comes first	
	Daily	100h / 1year
Check sterndrive unit oil level (Transmission)	●	
Trim pump oil level	●	
Steering fluid level	●	
Check water pickups for debris or marine growth	●	
Check water strainer and clean	●	
Inspect sterndrive unit anodes and replace if 50% eroded	●	
Lubricate propeller shaft and the retorque the nut		●
Touch-up power package paint and spray with Corrosion Guard (Transmission)		●
Change sterndrive unit oil (Transmission)		●
Retorque connection of gimbalring to steering shaft		●
Check steering system and remote control for loose, missing or damaged parts		●
Lubricate cables and linkages		●
Inspect U-joints, splines and bellows. Lubricate U-joints splines		●
Check engine alignment		●
Check gimbal bearing and engine coupler		●
Check continuity circuit for loose or damaged connections		●
Check MerCathode unit		●

Filter replacement (Transmission)

1) The first replacement must be performed after 25 hours of operation.
2) The oil must be changed whenever the filter is replaced.

CAUTION

YOU SHOULD EXERCISE THE UTMOST CARE TO PREVENT INJURY TO YOURSELF OR ENGINE DAMAGE WHENEVER PERFORMING ANY MAINTENANCE.

MAINTENANCE LOG

DATE	MAINTENANCE PERFORMED	ENGINE HOURS

CHAPTER 14
TROUBLESHOOTING GUIDE

■ Starter motor does not crank the engine

Possible Causes	
•Engine stop switch “ON” position •Safety Stop Switch activated	•Engine is not shifted to neutral position •Wrong neutral switch connection to EOI
•Weak battery or battery connections are loose or corroded	•Starter motor solenoid or slave solenoid failure
•Ignition key switch failure	•Blown fuse at EOI
•Wiring or electrical connection fault	•Defective ECU

■ Engine cranks but does not start

Possible Causes	
•Weak battery or bad starter motor	•Low fuel pressure
•No fuel	•Low compression pressure
•ECU not functioning	•Crank position sensor not functioning
•Incorrect starting procedure	•Fuel is not reaching the engine
•Faulty fuel filter or electric fuel pump	•Bad fuel quality or water in fuel
•Faulty fuse	•Faulty injector

■ Engine starts with difficulty or starts and stalls

Possible Causes	
•Low fuel pressure in fuel rail	•Fuel return line not connected at injector
•Leakage in high pressure fuel circuit	•Faulty alternator or voltage regulator
•Faulty fuse	•No engine coolant temperature sensor signal
•No rail pressure sensor signal	•Low battery voltage
•Oil level too high or too low	•Low compression pressure
•ECU program error or hardware fault	•Clogged fuel filter

■ Engine idle is rough

Possible Causes	
•Fuel return line not connected at injector	•Low compression pressure
•No rail pressure sensor signal	•Injector clamp poorly tightened
•Wiring harness open or poor connection	•Faulty high pressure fuel pump
•Bad fuel quality or water in fuel	•Faulty injector
•Clogged fuel filter / air filter	•Carbon deposit on the injector

■ **Engine rattling, noisy engine**

Possible Causes	
•Compensation of individual injector not adapted	•No engine coolant temperature sensor signal
•Low compression pressure	•Clogged injector return line
•No rail pressure sensor signal	•Faulty injector
•Poor injector O-ring	•Carbon deposit on the injector

■ **Uneven acceleration / deceleration**

Possible Causes	
•Intermittent faulty fuel line connection	•Oil suction
•No rail pressure sensor signal	•ECU program error or hardware fault
•Leakage in intake system	•Damaged turbocharger or leakage in vacuum line
•Clogged fuel filter	•Low compression pressure
•Leakage in high pressure fuel circuit	•Injector needle stuck

■ **Engine stop**

Possible Causes	
•Run out of fuel / Safety Stop Switch activated	•Crank signals missing
•Fuel feed line not connected	•Fuel pressure regulator valve contaminated, stuck, jammed
•Leakage in high pressure fuel circuit	•Rail pressure regulator valve contaminated, stuck, jammed
•Fuel out of specification	•Faulty alternator or voltage regulator
•Bad fuel quality or water in fuel	•Faulty high/low pressure fuel pump
•Clogged low pressure fuel circuit	•ECU program error or hardware fault

■ **Performance loss**

Possible Causes	
•Compensation of individual injector not adapted	•Leakage at the injector
•Clogged air filter	•Fuel or intake air temperature too high
•Oil level too high or too low	•Engine coolant temperature too high
•Damaged turbocharger or intake air leakage	•Low compression pressure
•Clogged fuel filter	•Poor valve clearance

CHAPTER 15
WARRANTY

WHAT IS COVERED

Hyundai SeasAll warrants its new products to be free of defects in material and workmanship during the period described below.

DURATION OF COVERAGE

This Limited Warranty provides coverage for two (2) years from the date the product is first sold to a recreational use retail purchaser or when the Product has been operated for 1000 hours, whichever occurs first. This Limited Warranty provides coverage for one (1) year from the date the product is first sold to a commercial use retail purchaser or when the Product has been operated for 1000 hours, whichever occurs first. This limited warranty is transferable to a subsequent purchaser, but only for the remainder of the unused portion of the limited warranty. To transfer the warranty to the subsequent owner, send or fax a copy of the bill of sale or purchase agreement, new owner's information and engine serial number to Hyundai SeasAll's distributor or dealer. Upon processing the transfer of warranty, Hyundai SeasAll will send registration verification to the new owner of the product by mail.

WARRANTY REGISTRATION

Your selling dealer fills out the Warranty Registration Card and mails it to the distributor responsible for administering the warranty registration for your country. Warranty Registration must be made no later than 15 days from the date of sale after purchase from authorized dealer. The Warranty Registration Card identifies information on customer and product, models and serial numbers, date of sale, type of use and the selling dealer.

The distributor or dealer also certifies that you are the original purchaser and user of the product. A copy of the Warranty Registration Card, designated as the Purchaser's Copy, must be given to you immediately after the card has been completely filled out by the selling distributor or dealer.

This card represents your registration identification, and should be retained by you for future use when required. Should you ever require warranty service on this product, your dealer may ask you for the Warranty Registration Card to verify date of purchase and to use the information on the card to prepare the warranty claim forms.

CONDITIONS THAT MUST BE MET TO OBTAIN WARRANTY COVERAGE

Warranty coverage is available only to retail customers who purchase from a dealer authorized by Hyundai SeasAll to distribute the product in the country in which the sale occurred, and then only after the Hyundai SeasAll specified pre-delivery inspection process is completed and documented. Warranty coverage becomes available upon proper registration of the product by the authorized dealer. Routine maintenance outlined in the Installation and Operation Manual must be performed in a timely fashion in order to obtain warranty coverage. Hyundai SeasAll reserves the right to make any warranty coverage contingent upon proof of proper maintenance.

WHAT HYUNDAI SEASAll WILL DO

Hyundai SeasAll will pay for all parts and labor needed to repair the damage to the product resulting from a defect in materials or factory workmanship.

The warranty does not apply to any damage or defect that is the result of abnormal use or carelessness.

The repair or replacement of parts, or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

OWNER'S OBLIGATIONS

It is the owner's obligation to install, operate, maintain and care for Hyundai SeasAll engines in accordance with the instruction and requirements stated in the Installation and Operation Manual.

The owner is responsible for providing enough time and cooperation to get the engine repaired by an authorized dealer, and to deliver it to a proper facility for repair.

The owner is responsible for the cost for warranty inspection, including landing, launching and transport.

HOW TO OBTAIN WARRANTY COVERAGE

The customer must provide Hyundai SeasAll with a reasonable opportunity to repair the engine, as well as reasonable access to the product for warranty service. Warranty claims shall be made to a Hyundai SeasAll Authorized Repair Facility to service the product. Purchaser shall not, unless requested by Hyundai SeasAll, ship the product or parts of the product directly to Hyundai SeasAll. The warranty registration card is the only valid registration identification and must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

LIMITATIONS – EXPENDABLE PARTS

• Filters : fuel filter, engine oil filter, air filter
• Engine oil and coolant and other fluids such as power steering fluid and hydraulic trim fluid
• Rubber products : seawater pump impeller, rubber hoses, drive belt
• Gaskets, anodes, thermostat

WHAT IS NOT COVERED

• Fuel injector or filter cleaning
• Drive belt or control adjustments or lubrication checks made in connection with normal services.
• Damage caused by neglect, lack of maintenance, accidents, abnormal operation, improper installation or service, unapproved modification or freezing temperatures.
• Haul-out, launch or towing charges; removal and/or replacement of boat partitions or material for necessary access to the product when such service is due to boat design; all related transportation charges and/or travel time, etc.
• All incidental and/or consequential damages (storage charges, telephone or rental charges of any type, inconvenience or loss of time or income) are the owner's responsibility.
• Use of other than Hyundai SeasAll genuine replacement parts when making warranty repairs.
• Participating in or preparing for racing or other competitive activity.
• Water entering the engine via the air inlet filter or exhaust system or submersion. Water in the starter motor.
• Failure of any parts caused by lack of cooling water.
• Use of fuels and lubricants that are not suitable for use with or on the product. Please refer to Installation and Operation Manual.

TRANSMISSION AND STERNDRIVE WARRANTIES

The ZF Marine Transmissions and CMD/Mercury/MerCruiser Diesel Sterndrive Bravo Models are covered under separate warranties, and serviced by those companies. For information on those warranties, please see the separate booklets included in the original packaging of your Hyundai SeasAll purchase.

ABSOLUTE MARINE POWER
HYUNDAI SEASALL

WARRANTY REGISTRATION CARD

Please fill out the following registration card in English.

Date of Sale

Month	Day	Year

■OWNER'S INFORMATION

Name/Company		ZIP Code/Post Code	
Street/P.O. Box			
City		State/Province	
Country		E-Mail	
Telephone		Mobile Phone	

■ DEALER INFORMATION

Dealer Name		Dealer Code	
City		State/Province	
Country		E-Mail	
Telephone		Mobile Phone	

■ ENGINE INFORMATION

Number of Engines	Single ☐ Dual ☐

Engine Model		Gear Model	
Engine Serial No.		Gear/Drive Serial No.	

Engine Model		Gear Model	
Engine Serial No.		Gear/Drive Serial No.	

■ BOAT INFORMATION

REPOWER ☐

Manufacturer		Material	Steel ☐ Alu. ☐ FRP ☐ Wood. ☐		
Model		LOA	ft	Beam	ft
Boat Type		Hull ID			
Type of Use	Pleasure ☐ Commercial ☐	Planing ☐ Semi Disp.☐ Displacement ☐			

© 2012 HYUNDAI SEASALL

Text, figures and standards in this guide are based on information current at the time of printing. Reprinting, reproduction or translation, in whole or in part, is not permitted without the written approval of HYUNDAI SEASALL. All rights according to the applicable copyright laws are expressly reserved for HYUNDAI SEASALL. Subject to alterations.

www.hyundai-seasall.com

ABSOLUTE MARINE POWER

HYUNDAI SEASALL

www.hyundai-seasall.com | 460-26 Sam-dong, Uiwang-si, Gyeonggi-do 437-815, Korea
Fax : +82-70-8244-8555 I Tel : +82-70-8620-8035 I seasall.info@hyundai-seasall.com

ISSUED November 2012
Copyright © 2012 Hyundai SeasAll Co., Ltd. All rights reserved.